

On Elephants in Manasollasa – 2. Diseases and Treatment

Nalini Sadhale¹ and Y L Nene²

1. B-1, Kanakalaxmi Apartments, Street No. 6, Hardikar Bagh, Himayatnagar, Hyderabad – 500 029, Andhra Pradesh, India (email: nalinisadhale@vsnl.net)
2. Asian Agri-History Foundation, Secunderabad – 500 009, Andhra Pradesh, India (email: ynene@satyam.net.in)

Abstract

Hastishastra or the science dealing with elephants originated in India. Kings in ancient India maintained a separate division of manned elephants in their armies. Capturing elephants from forests and managing them was an important activity in most kingdoms. The article “On elephants in Manasollasa – 1. Characteristics, habitat, methods of capturing and training” was published in the previous issue of this journal. In this article English translation of 58 verses (Manasollasa: Section II, Chapter 6 – Baladhyaya) and a commentary are presented. It is obvious that the knowledge of was extensively used to treat various ailments of elephants during the twelfth century AD. The reference to plant diseases is worth noting.

This article should be read in continuation of our earlier article (Sadhale and Nene, 2004). The following are the fifty-eight verses dealing with nourishment and upkeep of the elephants as also their ailments and treatments (Shrigondekar, 1925; Manasollasa: Section II, Chapter 6 – Baladhyaya). A large number of Sanskrit names for herbs appear in the text. Readers will find the Latin equivalents in Table 1.

Translation

General

620. Brave elephants of good breed, born in the Kalinga (region between Vaitarini river in Orissa to the mouths of Godavari) forest, when well trained and kept ready, are victorious in war.

621. A single well-developed brave elephant of huge size, equipped with all the desirable marks, having eyes rolling with intoxication is sufficient to vanquish the enemy.

622. The real strength of the kings desiring victory in war is the division of elephants. So the kings should recruit several elephants in their armies.

Food and other comforts

623. The king, therefore, should make a special effort in providing proper nourishment to them. They should be provided the best rice mixed with ghee and enriched with curd,

624. – food that is rich in fats, pieces of sugarcane sweet like nectar, rice plants tender and green like a parrot’s feathers,

625. – gruel of newly harvested wheat, stalks of barley, along with fruits as also grass either green or dry, depending upon the season, and

626. – various milk preparations sweetened with sugar, and water twice a day. By providing bathing facilities (in rivers etc.),

627. – bed on soft dust and enjoyment of sporting in dust, the elephants should be kept happy so that they develop well physically.

Ailments

628. Captivity, lashing, ailments, memories of the happiness of freedom enjoyed in the forest, staying in the captivity only physically with heart elsewhere, incompatible food, indigestion, exertion, and lack of sleep,

629. – are basic causes of the diseases of the elephants. Those should be properly treated by medicines procured from forests or purchased from the shops.

Prescriptions

630. [The length of the animal determines the dose of the medicine]. Thus per *aratni* (45 cm) the dose of a powder is ten *palas* (350 g), that of a thick paste is double of that (twenty *palas*) and that of a decoction is stated to be an *adhaka* (2 L).

631. When the prescription (mentioned hereunder) merely states the name of a medicinal plant, it should be interpreted as the root of that plant*. The word 'liquid' indicates water reduced to half** of the quantity initially added (to prepare a decoction). *Kala* (time) should be taken to mean the time of waking up in the morning (early morning) and the word 'urine'*** means elephant's urine.

[i. *Root, bark, leaf, flower and fruit are the five parts, technically called *panchanga* of a tree or a plant used in the preparation of medicines. Usually the part to be used is specified. Here the writer wishes to indicate the root part although not so specified.

ii. **For preparing decoction for treating humans, generally the quantity of water added to the ingredients is in the proportion of 16:1. It is reduced to one fourth of this quantity in the boiling process to prepare a decoction. Here the writer instructs to reduce it to half, for preparing decoctions for elephants.

iii. ***The word 'urine' normally indicates cow's urine in the ayurvedic prescriptions. In the case of elephants here, it is indicative of elephant's urine according to the author.]

Special care of a new captive

632. An elephant afflicted by pain caused by his new (first) captivity should be made to drink water from big tubs. He should be made to come out of water (in which he should be allowed to pass most of the day time) only when half a *yama* and a *nadika* is all that remains of the day.

[A *yama* is equal to three hours and a *nadika* is equivalent to twenty-four minutes.]

633. The elephant should then be tied to a post. He should be sprinkled with ghee that is washed hundred times, all over the body, day and night, by an expert.

634. After two days, the elephant should again be sprinkled thoroughly with ghee. If suffering from cold, an experienced person should sprinkle the elephant with some oil.

635. Gradually, the time he is allotted to pass in water should be reduced. He should be given sugarcane pieces, lotus stalks and lotus fibers as also tasty plants to eat.

636. The plantains, bulbs, roots of the water lily, *shringataka*, *kaseruka*, roots of *madhu kakola*, *vara* (?) as also that of *aragvadha*,

637. – and all that pleases the mind of the elephant should be given to him to alleviate his despondence. And now I shall state the remedial measures to be adopted in the case of elephants suffering from physical ailments.

Fever

638. I shall deal with the master of all diseases first. It attacks the “sentient” and the “non-sentient” alike. It goes under various names and can attack anyone from the time of birth till the end.

639. It goes by the name *jwara* (fever) among humans, *palaka** (*pakala* and *pakaja* being the other readings) with reference to the elephants, *abhitapa* in case of the horses, and *varaka* (*kharaka* and *rewaka* are the other readings) in the case of donkeys.

[*‘*palaka*’ can be easily connected with the name, ‘Palakapya’, the sage who wrote the first work on *hastishastra*. Perhaps the sage came to be known by this name as he knew some cure for the deadly disease.]

640. It is called *alaska* with reference to camels and *ishvara* with reference to cows, *akshaka* when it relates to snakes and *haridra* when it concerns buffaloes.

641. *Pralapa* is the fever of sheep, *mrigaroga* of the deer, *avapata* of the birds, and *indramada* of fish.

642. The name of the fever of bushes is *granthika*, of trees and medicinal plants is *jyoti*, of flowers it is *parvata* and of lotus creepers it is *rupaka*.

643. It is called *churnaka*, *lala*, *madhuka*, *ushara* and *nilika* when the context is of grains, *kodrava*, vegetables, earth, and water respectively.

644. All these are the names indicating ‘fever’ alone in this world. Except human beings no other species can tolerate fever.

645. No instructions for the treatment of *palaka* are, therefore, provided. It encroaches first all the inner vital elements* and appears on the surface (of the body) only in an advanced stage.

[*Fluids, blood, flesh, fat, bones, bone marrow, and semen are stated to be the seven inner *dhatu*s or elements.]

646. *Palaka* being almost incurable is, therefore, a deadly disease. Most of the scholars have, therefore, not described the treatment of this disease.

Treatment of diseases of *kafa* and *vata*

647, 648. *Suvaha*, *surasa*, *daru*, *musta*, *kushtha*, *rasonaka*, *madhushirsha*, *vidanga*, *bharngi*, two varieties of *siddharthaka*, *mulaka*, *panchakola*, two types of *karanja*, the great *panchamulas* are the remedies prescribed for the treatment of the diseases caused by (imbalance of) *kafa* (phlegm) and *vata* (wind).

Treatment of diseases of *vata* and *pitta*

649, 650. All the diseases of elephants caused by (imbalance of) *vata* (wind) and *pitta* (bile) are cured without fail, by a mixture of *guduchi*, two types of *parnika*, two types of *meda*, *jivaka* and *rishabha*, two types of *kakoli*, *ashvagandha*, *vidari* and *shatavari*, either in powder, paste, or decoction form.

Treatment of diseases of *kafa* and *pitta*

651. *Patola, patha, kushtha, nimba, dhatri, amrita, visha, dhanyaka, parpata tikta* and *vatsaka* are prescribed for curing the diseases caused by (imbalance of) *kafa* (phlegm) and *pitta* (bile).

[As per the theory of Ayurveda, diseases are caused due to the vitiation of one, two or all the three *doshas* (imbalances of *kafa, vata, and pitta*). As the diseases of elephants are treated here on the basis of vitiation of two *doshas* only, it is possible to guess that diseases of elephants are not caused by vitiation of one or three *doshas*.]

Remedy for pain

652. *Hingu, sauvarchala, shunthi* and cane jaggery are prescribed as a remedy for pain and also application in the eyes of the paste of *tryushana** or of *shunthi* alone is prescribed (as a remedy for the same).

[**Tryushana* is *shunthi, maricha, and pippali* mixed to form a soft thick paste. It should be noted that Ayurveda recommends application of medicines in the eyes as a remedy for acute pain.]

Stomach disorders and treatment

653, 654. The combination of *ashvagandha, kana, ratri, krimighna, rasapanchaka* (?)* each taken in the quantity of eight *palas* (280 g) (but not exceeding one fistful in quantity) compounded with *panchalavana* (five salts) completely cures the diseases caused by *maruta* (wind). The same combination cures strangury (painful discharge of urine), inflation and pain of stomach. [The five salts are: *saindhava* (sodium chloride – rock salt), *sauvarchala* (black salt; *kala namak*), *vid* (sodium sulfate with traces of iron sulfide), *samudra* (sodium chloride), and *gadam* (*sambhar* salt – sodium chloride, sodium sulfate, and sodium carbonate).]

[**Amalaki* (*Emblica officinalis* Gaertn.) contains five out of six *rasas* (tastes) (excepting the saline), viz., sweet, sour, pungent, bitter, and astringent. It is possible that the word *rasapanchaka* here indicates *amalaki*.]

Appetite and digestion

655–657. The combination of *kutaja, shringavera, yavakshara* (impure carbonate of potassium and sodium), *chitraka*, two types of *puti, siddhartha, vidanga, ativisha, ghana, pippali, pippalimula, rajani, shigru, kushthaka*, salt, *vacha* and *hingu* when powdered and mixed with cow dung is the superb medicine for strengthening *jatharagni* (the power of digestion) of elephants. The same medicine also completely cures *samavayu* (the toxin produced due to indigestion mixed with *vata*) and the disorders caused by it.

658, 659. A lump made out of the powders of *saindhava* (rock salt), *jiraka, danti, shringavera, triphala*, two types of *karanja, krishna, patola*, leaves of *nimba, jyotishmati, guduchi*, and *vasa* destroys the elephant's desire of eating mud enhancing quickly the digestive power.

660. *Trivrit, arka, snuhi, danti, nili, lavanapanchaka* (five salts; see 653, 654), and *brahmi* are purgatives and cure pain, germs and inflation of stomach.

Throat disorders and treatment

661–663. The powders of *patha, patola, kushtha, nimbabhu, nimbaparpata, jyotishmati, snuhi, vasa, chavya, granthika, shigruka, vacha, katphala, rodhra, chitraka*, fruits of two types of *brihati* (*brihati* and

kantakari), *tikta*, *duralabha*, *ratri*, *karanja*, *triphala*, *trikatu*, *trayamana*, *paushkara*, *gajapippali*, and *dhataki* mixed with honey cure throat diseases.

Edema and its treatment

664, 665. *Saindhava*, *nagara*, *kushtha*, *vacha*, *shigru*, two types of *nisha* (*haridra* and *daruharidra*), *siddharthaka*, and *yavakshara* (impure carbonate of potassium and sodium) all powdered together, mixed thoroughly with curd and slightly heated cure the edema caused by *kafa* and *vata* (wind). Making the (affected) part (of the body) sweat by covering it or by other appropriate means can also cure edema.

666. When edema is ripe and ready to suppurate, the dung of the elephant mixed with *saindhava* (rock salt) should be applied carefully on the wound to drain out the pus.

Treatment of wounds

667. When the elephant is freshly wounded and the blood and the bile get extremely imbalanced, a mixture of ghee and honey should be filled in the wound for a period of three days.

668. The leaves of *tila* and *nimba*, pounded with *rajani* and mixed with honey is the best medicine for cleaning and healing of the wounds.

Disorders of the eyes and their treatment

669, 670. A wick (a kind of a soft stick to be directly applied to the eyes like collyrium) made out of the fruits of *kataka*, *rodhra*, *madhuka*, thick paste of *chandana*, *prapoundarika*, *manjishtha*, *valaka* and *aushiraka* [a product from *ushira* (vetiver) ?] is recommended for all the eye-diseases of elephants. The powder and the liquid of the same are also recommended for the purpose.

Wounds of soles

671–674. *Trivrit* should be poured into the extract of the trees having milky sap and the powders of *triphala*, *rochana*, *laksha* (a resinous substance secreted by a scale insect (*Laccifer lacca* Kerr) and used chiefly in the form of shellac, *sindura* (red lead), *rodhra*, *guggula*, *bhallata*, *rajani*, *ghontaphala*, *kasira* (*kasima*), *saindhava* (rock salt), the *saurashtrikanjana* [antimony (?)] or a special clay from Saurashtra (Gujarat) having alum-like properties], extract of *sarja*, *shriveshtha* (oleoresin from pines) should be mixed with it and the mixture should be heated on low fire constantly stirring with a large ladle till it becomes a thick and sticky paste. An expert should apply a thick layer of this for dressing wounds of the elephant's sole and then tie it with a piece of cloth. With this ends the topic of elephants' diseases and their treatment.

Sanskrit glossary for some medicines used for the elephants

675–677. [This portion is numbered among the verses but is actually composed in prose.]

Parnika = *mudgaparni*, *mashparni*. *Uragandha* = *vacha*, *rasona*. *Rasa-panchaka* (no equivalents for this are stated). *Putidwaya* = *krishna*, *pippali*. *Vasa* = *atarushaka*. *Granthika* = *pippalimula*. *Katphala* = *kashmirya*. *Saurashtrika* = *tuvaramrittika*. *Trivrit* = *trisneha*. *Shriveshtha* = *saraladruma-niryasa* [exudation from *sarala* (*Pinus roxburghii* Sar.) tree].

Discussion

Verses 630 through 677, taken from Section II, Chapter 6 – Baladhyaya, deal with the common ailments of domesticated elephants. It is obvious that treatments of such ailments must have been worked out after a good deal of experimentation. Logically, most of the treatments are based on Ayurveda, which possesses a wealth of knowledge on medicinal plants and their use in treatment of diseases. A close look at the recommended herbals will convince anyone that the knowledge of treating humans under the Ayurvedic system had been extended to animals such as elephants (Chunekar and Pandey, 1998).

Verses 623 through 627 deal with nourishment and other comforts to be provided to captive elephants. The components of food ration included cereals such as rice (enriched with curd), and wheat (gruel), fat-rich foods (oilseeds ?), succulent fodder consisting of plants and sugarcane, fruits, and green or dry grasses. Grasses that elephants in their natural habitat eat are: *Saccharum spontaneum* L., *Panicum* spp., *Sorghum* spp., *Arundinella* spp., *Eragrostis* spp., and others (Daniel, 1998). At the present time, mahouts often feed tender branches of trees, many of which apparently do not constitute elephant's normal food in forests. Milk and milk products, sweetened with sugar were also recommended in the diet. For comfort, soft dust bed and bathing facilities have been mentioned.

Verses 628 and 629 refer to psychological problems such as the captivity and “memories of happiness of freedom enjoyed in the forest” and physical problems such as “incompatible food, exertion and lack of sleep”. It seems the author of Manasollasa, quite rightly, has traced the origin of most disorders to frustrated mind; unsuitable food, exertion, and lack of adequate rest (sleep). Most medical practitioners today trace the root cause of many human ailments to the lack of the same basic psychological and physical requirements.

Verses 630 and 631 indicate kinds of prescriptions (pastes, decoctions, etc.) and an indication of the quantities of required medicines to be calculated on the basis of animal's length. Today we calculate dosages of medicines per unit of body weight. When facilities to weigh an animal of the size of elephant were not available, it was most appropriate to relate dosages to parameters such as the length or height of the animal.

Special care was provided to newly captured elephants (verses 633–637). For a few days, these were given a lot of water to drink, massaged with ghee which was washed a hundred times, protection of the dark skin from exposure to sun, and were fed sugarcane, lotus stalks, water chestnut, bulbs and roots of water lily, tubers of *kaseruka* (*Scirpus grossus*), etc. All this special treatment was given to calm down the animal and make it comfortable.

[Cleansing of the ghee with water enhances its efficacy. If washed hundred times the efficacy of the ghee is further enhanced. It is the washing of the ghee and not that of the elephant, which is recommended.]

Verses 638 through 646 deal with a topic called “fever”. There was a distinct name given to the “fever” of groups of animals and plants. From the description, it is evident that the terms used for “fever” were for the chronic illnesses for which a cure was not known, and the suffering individual was expected to die. Since Ayurveda treated all animals and plants on the basis of *tridosha* (imbalance of each of the three humors – *kafa*, *vata*, and *pitta*), it is not surprising to find names given to incurable diseases of plants as well. In verse 643, we find the term *churnaka* specified for grains, *lala* for *kodrava* (*Paspalum scrobiculatum* L.), and *madhuka* for vegetables.

The word *churnaka* in Sanskrit means a powdery mass. It is most likely that the word was used for smut diseases, which affect cereal grains quite commonly and no remedy was known at the time of Someshvardeva. The word *lala* means saliva or saliva-like, which could easily be the honeydew stage of ergot disease; *kodrava* (*P. scrobiculatum*) is commonly affected by ergot under high humidity conditions. The British foresters recorded common occurrence of ergot in *P. scrobiculatum* in 1930s in Chennai (Daniel, 1998). The word *madhuka* means honey or honey-colored. Could this be a reference to blights, especially of the cucurbits and brinjal that used to be the major vegetables consumed? When a blight

occurs, leaf color changes from green to yellow to light brown before necrosis occurs. In verse 642, the “fever” of bushes is called *granthika*, which in Sanskrit means knots. One wonders whether root-knot nematode infestation was common in bushes. The word *jyoti* was given to the “fever” of medicinal plants; *jyoti* connotes Sun and Moon indicative of heat and cold. Diseases of medicinal plants caused by heat and cold that may destroy the medicinal properties of these plants may be connected here. Thus the word *jyoti* may connote “sun scald” or “low temperature injury”. The relevance of the term *parvata* to flowers and that of *rupaka* to lotus creepers could not be established. *Parvata* can indicate hardening. Could it be connected with a fatal disorder in flowers which involves hardening of petals, etc.? *Rupaka* is something that superimposes itself on the original color, shape, etc. The word also connotes white color. Is it a reference to heavy powdery mildew that would make leaves appear grayish white?

It is interesting that the author of Manasollasa considers a saline, infertile soil (*ushara*) as an incurable “fever” of soil and dark blue-black (polluted) water (*nilika*) as the “fever” of water (verse 643).

It has been stated that no other entity, except humans, can recover from “fever” (verse 644). This must be a reference to those fortunate few humans, who survived the chronic ailments.

From verses 647 through 674, the author of Manasollasa describes the ailments that could be cured mostly through herbal medicines and the use of a few salts. The diseases were treated following the Ayurvedic prescriptions with dosages adjusted to the size of elephant. The ailments included disorders caused by the imbalance of *kafa* , *vata* , and *pitta* (verses 647–651), non-specific body pain (verse 652), eye problems (verses 652, 669, 670), digestive disorders (verses 653–660), throat problems (verses 661–663), edema or dropsy (verses 664–665), open wounds (verses 667–668), and the sole wounds that occur most frequently. The Mughal king, Jahangir had recorded in detail an incident of rabies in two of his favorite elephants in early 17th century (Nene, 1998). Subsequently the British also recorded incidence of rabies (Daniel, 1998). Watt (1890) mentioned two major diseases of elephants, the dropsy and the wasting disease. It is evident that though the knowledge of elephant diseases had increased substantially by the 19th century, ayurvedic medicines still found frequent applications (Watt, 1890). Today we know several diseases of elephants such as tuberculosis, tetanus, enterotoxaemia, anthrax, haemorrhagic septicaemia, colibacillosis, salmonellosis, leptospirosis, rabies, foot and mouth disease, as also those described in Manasollasa (Rehman, 2003). The “fever” could be tuberculosis, which was not understood until the 19th century.

It should be noted that the modern authors (e.g., Daniel, 1998) have based their writings mainly on the accounts published by the British foresters and hunters, and have unfortunately ignored the knowledge that existed since the ancient times.

Acknowledgment

The authors are grateful to Dr Shakuntala Dave for her assistance on aspects related to Ayurveda.

References

- Chunekar, K.C.** and **Pandey, G.C.** 1998. Bhavaprakasa Nighantu (Indian Materia Medica) of Sri Bhavamisra. Chowkhamba Bharati Academy, Varanasi – 221 001, India. 984 pp.
- Daniel, J.C.** 1998. The Asian Elephant – A Natural History. Natraj Publishers, Dehra Dun, Uttar Pradesh, India.
- Nene, Y.L.** 1998. Jahangir: A naturalist – II. Description of fauna. Asian Agri-History 2:97–120.
- Rehman, T.** 2003. Infectious and non-infectious diseases of elephants. In: Health Care, Breeding and Management of Asian Elephants (Das, D., ed.). Publ. Course Director, Refreshers’ Course for Field Veterinarians and Director, Project Elephant, Government of India, New Delhi. Assam Agricultural University, Khanapara, Guwahati, Assam, India. pp. 108–118.

Sadhale, Nalini and Nene, Y.L. 2004. On elephants in Manasollasa – 1. Characteristics, habitat, methods of capturing and training. Asian Agri-History 8:5–25.

Shrigondekar, G.K. 1925. Manasollasa Vol. I. Gaekwad's Oriental Series No. XXVIII. Baroda, India. (The present translation is based on this text.)

Watt, G. 1890. A Dictionary of Economic Products of India. Volume 3. Cosmo Publication, New Delhi, India. (Reprinted 1972.)

Table 1. Herbs used for treatment of elephant diseases.

Sanskrit name	Latin name	Verse no.
Amrita	<i>Tinospora cordifolia</i> (Willd.) Hook.f. Thomp.	651
Aragvadha	<i>Cassia fistula</i> L.	636
Arka	<i>Calotropis gigantea</i> Ait.	660
Ashoka	<i>Saraca asoca</i> (Roxb.) de Wilde	636
Ashvagandha	<i>Withania somnifera</i> (L.) Dunal	649, 650, 653, 654
Ativisha	<i>Aconitum heterophyllum</i> Wall. ex Royle	655, 656, 657
Bhallata	<i>Semecarpus anacardium</i> L.f.	671, 672, 673, 674
Bharngi	<i>Clerodendrum indicum</i> (L.) Kuntze	647, 648
Brahmi	<i>Bacopa monniera</i> (L.) Penell	660
Brihati	<i>Solanum indicum</i> L.	661, 662, 663
Chandana	<i>Santalum album</i> L.	669, 670
Chavya	<i>Piper chaba</i> Hunter	661, 662, 663
Chitraka	<i>Plumbago zeylanica</i> L.	655, 656, 657, 661, 662, 663
Danti	<i>Baliospermum montanum</i> (Willd.) Muell.-Arg.	658, 659, 660
Daru	<i>Cedrus deodara</i> (Roxb. ex Lamb.) G. Don	647, 648
Daruharidra	<i>Coscinium fenestratum</i> (Gaertn.) Colebr.	664, 665
Dhanyaka	<i>Coriandrum sativum</i> L.	651
Dhataki	<i>Woodfordia fruticosa</i> (L.) Kurz	661, 662, 663
Dhatri	<i>Emblica officinalis</i> Gaertn.	651
Durlabha	<i>Alhagi pseudalhagi</i> (Bieb.) Desv.	661, 662, 663
Gajapippali	<i>Scindapsus officinalis</i> (Roxb.) Schott	661, 662, 663
Ghana	<i>Flacourtia indica</i> (Burm.f.) Merr.	655, 656, 657
Ghontaphala	<i>Ziziphus xylopyra</i> Willd.	671, 672, 673, 674
Granthika	<i>Artemisia nilagirica</i> (Clarke) Pamp.	661, 662, 663
Guduchi	<i>Tinospora cordifolia</i> (Willd.) Hook.f. Thomp.	649, 650, 658, 659
Guggula	<i>Commiphora wightii</i> (Arnott) Bhandari com. nov.	671, 672, 673, 674
Haridra	<i>Curcuma domestica</i> Val.	664, 665
Hingu	<i>Ferula assafoetida</i> L.	652, 655, 656, 657
Jiraka	<i>Cuminum cyminum</i> L.	658, 659
Jivaka	<i>Malaxis acuminata</i> D. Don	649, 650
Jyotishmati	<i>Cardiospermum halicacabum</i> L.	658, 659, 661, 662, 663
Kakola	<i>Piper cubeba</i> L.f.	636
Kakoli	<i>Ziziphus napeca</i> Willd.	649, 650
Kana	<i>Piper longum</i> L.	653, 654
Kantakari	<i>Solanum surattense</i> Burm.f.	661, 662, 663
Karanja	<i>Pongamia pinnata</i> (L.) Pierre	647, 648, 658, 659, 661, 662, 663
Kaseruka	<i>Scirpus grossus</i> L.f.	636
Kasira/Kasima	(?)	671, 672, 673, 674
Kataka	<i>Strychnos potatorum</i> L.f.	669, 670
Katphala	<i>Myrica esculenta</i> Buch.-Ham. ex D. Don	661, 662, 663
Krimighna	<i>Embelia ribes</i> Burm.f. (?)	653, 654
Krishna	<i>Piper nigrum</i> L.	658, 659

<i>Kushta</i>	<i>Saussurea lappa</i> C.B.Clarke	647, 648, 651, 655, 656, 657, 661, 662, 663, 664, 665
<i>Kutaja</i>	<i>Wrightia tinctoria</i> R.Br.	655, 656, 657
<i>Madhuka</i>	<i>Madhuca longifolia</i> (L.) Macb.	669, 670
<i>Madhushirsha</i>	(?)	647, 648

Sanskrit name	Latin name	Verse no.
<i>Manjishtha</i>	<i>Rubia cordifolia</i> L. <i>sensu</i> Hook.f.	669, 670
<i>Maricha</i>	<i>Piper nigrum</i> L.	652
<i>Meda</i>	<i>Polygonatum cirrhifolium</i> Royle	649, 650
<i>Mulaka</i>	<i>Raphanus sativus</i> L.	647, 648
<i>Musta</i>	<i>Cyperus rotundus</i> L.	647, 648
<i>Nagara</i>	<i>Flacourtia jangomas</i> (Lour.) Raeusch. (?)	664, 665
<i>Nili</i>	<i>Indigofera articulata</i> Gouan	660
<i>Nimba</i>	<i>Azadirachta indica</i> A.Juss	651, 658, 659, 668
<i>Nimbabhu</i>	<i>Swertia chirayita</i> (Roxb. ex Flem.) Karst	661, 662, 663
<i>bhunimba</i>		
<i>Nimbaparpata</i>	(?)	661, 662, 663
<i>Panchakola</i>	See <i>chavya</i> , <i>chitraka</i> , <i>nagara</i> , <i>pippali</i> , <i>pippalimula</i>	647, 648
<i>Pachamula</i> ¹	-	647, 648
<i>Parnika</i>	<i>Teramnus labialis</i> (L.f.) Spreng; <i>Vigna adiantha</i> (G.F.W.Meyer) Marachal	649, 650
<i>Parpata</i>	<i>Fumaria officinalis</i> L.	651
<i>Patha</i>	<i>Cissampelos pariera</i> L.	651, 661, 662, 663
<i>Patola</i>	<i>Trichosanthes cucumerina</i> L.	651, 658, 659, 661, 662, 663
<i>Paushkara</i>	<i>Costus speciosus</i> (Koen. ex Retz.) Sm.	661, 662, 663
<i>Pippali</i>	<i>Piper longum</i> L.	652, 655, 656, 657
<i>Pippalimula</i>	<i>Piper retrofractum</i> Vahl.	655, 656, 657
<i>Prapoundarika</i>	<i>Cassia absus</i> L.	669, 670
<i>Puti</i>	<i>Caesalpinia bonduc</i> (L.) Roxb. (?)	655, 656, 657
<i>Rajani</i>	<i>Mallotus philippensis</i> (Lamk.) Muell.-Arg.	655, 656, 657, 668, 671, 672, 673, 674
<i>Rasonaka</i>	<i>Allium sativum</i> L.	647, 648
<i>Ratri</i>	<i>Curcuma longa</i> L.	653, 654, 661, 662, 663
<i>Rishabha</i>	<i>Mucuna pruriens</i> (L.) DC.	649, 650
<i>Rochana</i>	<i>Derris indica</i> (Lam.) Bennet (?)	671, 672, 673, 674
<i>Rodhra</i>	<i>Symplocos racemosa</i> Roxb.	661, 662, 663, 669, 670, 671, 672, 673, 674
<i>Sarja</i>	<i>Vateria indica</i> L.	671, 672, 673, 674
<i>Sauvarchala</i>	<i>Helianthus annuus</i> L.	652
<i>Shatavari</i>	<i>Asparagus racemosus</i> Willd.	649, 650
<i>Shigru/shigruka</i>	<i>Moringa oleifera</i> Lamk.	655, 656, 657, 661, 662, 663, 664, 665
<i>Shringataka</i>	<i>Trapa natans</i> L.	636
<i>Shringavera/</i> <i>shunthi</i>	<i>Zingiber officinale</i> Rosc.	652, 655, 656, 657, 658, 659
<i>Siddhartaka</i>	<i>Brassica alba</i> (L.) Koch; <i>B. campestris</i> L. var. <i>sarson</i> Prain	647, 648, 655, 656, 657, 664, 665
<i>Snuhi</i>	<i>Euphorbia neriifolia</i> L.	660, 661, 662, 663
<i>Surasa (tulsi)</i>	<i>Ocimum sanctum</i> L.	647, 648
<i>Suvaha (nirgundi)</i>	<i>Vitex negundo</i> L.	647, 648
<i>Tikta</i>	<i>Picrorhiza kurroa</i> Royle ex Benth.	651, 661, 662, 663
<i>Tila</i>	<i>Sesamum indicum</i> L.	668
<i>Trayamana</i>	<i>Ficus heterophylla</i> L.f.	661, 662, 663
<i>Trikatu</i>	<i>Tribulus terrestris</i> L.	661, 662, 663

<i>Triphala</i> ²	-	658, 659, 661, 662, 663, 671, 672, 673, 674
<i>Trivrit</i>	<i>Operculina turpethum</i> (L.) Silva-Manso	660, 671, 672, 673, 674
<i>Vacha</i>	<i>Acorus calamus</i> L.	655, 656, 657, 661, 662, 663, 664, 665

Sanskrit name	Latin name	Verse no.
<i>Valaka</i>	<i>Pavonia odorata</i> Willd.	669, 670
<i>Vara</i>	(?)	636
<i>Vasa</i>	<i>Adhatoda vasica</i> Nees	658, 659, 661, 662, 663
<i>Vatsaka</i>	<i>Holarrhena antidysenterica</i> (L.) Wall. ex DC.	651
<i>Vidanga</i>	<i>Embelia ribes</i> Burm.f.	647, 648, 655, 656, 657
<i>Vidari</i>	<i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC.	649, 650
<i>Visha</i>	<i>Aconitum napellus</i> L.	651

1. Mixed dried root powder from *Clerodendrum phlomoides*, *Aegle marmelos*, *Stereospermum suaveolens*, *Gmelina arborea*, and *Oroxylum indicum*.
 2. Mixed dried fruit powder from *Terminalia bellirica*, *Terminalia chebula*, and *Embllica officinalis*.
-