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Ethno-Veterinary Medicinal Plants for the Effective Management of Parasitic Infestation in Livestock

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Abstract

This review explores Ethnoveterinary Medicinal (EVM) plants employed in the treatment of various parasitic diseases in livestock, highlighting their associated phytochemicals and antiparasitic properties. Our objective is to offer a structured overview of the herbs, including their botanical identification, phytochemical profiles and ethnomedicinal uses. We aim to enhance understanding of the potential benefits of EVM plants in livestock health management particularly parasitic infestations such as internal-external parasites including maggot wounds. To fulfil the objective, several well-known online search engines (*e.g.*, Web of Science, Google Scholar, Scopus-Elsevier, Taylor and Francis, Springer, DOAJ), along with Ayurveda literature, were used to empirically investigate the knowledge of EVM plants for their effectiveness against parasitic infestations. Data analysis indicates that approximately 86 plant species from 42 families are underutilized. A total of 26 different plant parts are utilized as traditional remedies for treating parasitic infestations. Internal parasite infestations are among the most prevalent issues in livestock. Plants from the Fabaceae family and leaf part, are the most commonly employed in livestock parasitic treatment. Phytochemicals such as flavonoids, saponins, alkaloids, tannins, and essential oils likely contribute to their antiparasitic activity. In addition, we reviewed *Mahakashaya*- a group of herbs referenced in the ancient *Ayurveda* literature to evaluate their potential for antiparasitic activity in veterinary practice management. The plants of *Krimighna, Kushthaghna*, *Kandughna* and *Vishaghna Mahakashaya* mentioned in *Ayurveda* combine traditional wisdom with contemporary scientific evidence, encouraging further research and discussion. This underscores the potential of herbal therapies to develop effective and sustainable strategies for controlling parasite infestations in livestock. Plant-based remedies are noted for their ability to reduce production losses and serve as alternatives to veterinary medicine, highlighting their therapeutic significance for livestock and dairy farmers through effective utilization as antiparasitic agents.

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Major Findings: Underutilized Ethnoveterinary Medicinal (EVM) plants include 86 species from 42 families, with 26 plant parts used against livestock parasites. Key phytochemicals (flavonoids, saponins, alkaloids, tannins, essential oils) contribute to antiparasitic properties, notably in Fabaceae family plants. *Ayurveda* classifications (*Krimighna, Kushthaghna*, etc.) align with modern findings, supporting sustainable herbal parasite management.

Keywords: Ethnoveterinary, Herbal Medicine, Livestock, *Pashu Ayurveda*, Parasitic Infestation

1. Introduction

Parasitic infestations are a significant concern in livestock management, affecting animal health, productivity, and the livelihoods of farmers globally. The effects of parasites range from anorexia, loss of body condition, anaemia, diarrhoea, enteropathy, and other direct and indirect impacts, leading to substantial economic losses to livestock owners. In India, the prevalence of gastrointestinal parasites was reported to be 47% in cattle, 42% in buffaloes and 51.89% in goats. Cattle in the South zone showed the highest prevalence at 60%, while in the North zone, both cattle and buffaloes had a prevalence of 52%. Specific regions like Tamil Nadu and Chhattisgarh demonstrated higher rates. Among parasitic species, *Ostertagia* spp. was common in cattle, *Buxtonella* spp. in buffaloes, and *Haemonchus* spp. Affected both cattle and buffaloes[1].

Anthelmintic treatments not only reduce parasitic infestations but also enhance livestock productivity by improving milk production and body weight gain, resulting in favourable cost-benefit ratios for farmers[2]. However, conventional anthelmintic treatments are effective but face growing challenges such as drug resistance, chemical residues in animal products, and environmental concerns. This has led to increased interest in exploring alternative approaches to managing parasitic infestations in livestock. Ethno-veterinary medicine, rooted in traditional knowledge, offers a promising alternative through the use of medicinal plants and natural remedies by local communities. These practices passed down through generations, provide a sustainable and often cost-effective option for livestock health. In India, schemes such as the Livestock Health and Disease Control (LH and DC) program support the control of animal diseases, including parasitic infestations[3]. This is further bolstered by initiatives like the National Animal Disease Control Programme (NADCP), launched in 2019 for the control of Foot and Mouth Disease and Brucellosis[4].

Ethno-veterinary practices have deep historical roots, particularly in South Asia, where sacred plants have long been worshipped and used in traditional medicine systems like *Ayurveda*[5]. For example, a group of six plants commonly worshipped by Asian people has also been noted for their wound-healing (*Vranaropana*), antimicrobial (*Krimighna*), and anti-inflammatory (*Shothahara*) properties in *Ayurveda*[6]. These plants, revered for their medicinal properties, have contributed to livestock healthcare practices, offering insights from *Pashu Ayurveda*, the ancient Indian animal care system. The documentation of indigenous knowledge is essential for utilizing these traditional methods in treating livestock diseases. Access to herbal resources, affordability, and acceptance of traditional remedies, especially in rural areas where modern healthcare facilities are limited, further emphasize their practical value[7].

The article aimed to document the Ethnoveterinary Medicinal (EVM) plants used in the treatment of different parasitic diseases of livestock along with their phytochemicals associated with antiparasitic activity.

2. Methodology

The present review aims to provide organized information on the ethno-medicinal applications of various herbs, their botanical nomenclature and phytochemicals. For this, several well-known searchable online search engines such as PubMed, Scopus, Web of Science, Google Scholar, Taylor and Francis, Springer, and DOAJ, along with ancient *Ayurveda* literary survey, were used to investigate the knowledge of EVM plants, with a special focus on their effectiveness in managing parasitic infestations in livestock. Keywords such as '*Ayurveda*', 'Ethno-veterinary', 'Antiparasitic activity', 'Plants', 'Livestock' and 'Phytochemical' were used to search the literature and collect relevant references. The study included plants traditionally used in India, both native Indian species and those introduced but widely accepted and utilized in ethno-veterinary practices. The *Latin* names of all plants adhere to the nomenclature specified in the 'World Flora Online' (www.worldfloraonline.org)[8].

In the traditional system of Indian medicine (AYUSH), information about plants used in veterinary

Table 1. List of ethnoveterinary medicinal plants used in parasite management in Livestock

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
1.	*Acalypha indica* L.	*Harita manjari/ Kuppi*	Khokali	Euphorbiaceae	Internal Parasite	Whole Plant, Leaf, Flower	Acalypus, Acalyphine, Cynogenic Glycosides, Inositolmethylether, Resin, Triacetomamine, Volatile Oils, Terpenoids, Flavonoids, Polyphenols	10
2.	*Achyranthes aspera* L.	*Apa marga*	Chirchita	Amaranthaceae	Internal Parasite Infestations, Tick Infestations	Leaf, Flower, Root	Aliphatic dihydroxyketone, 36-37-Dihydroxyhenpentacontan-4-on, Triacontanol	11
3.	*Albizia amara* (Roxb.) Biovin	*Krishna Shirisha*	Siras	Fabaceae	Lice Infestation	Whole Plant, Leaf	Macrocyclic Spermine Alkaloids, Echinocystic Acid, Linoleic Acid, Palamitic Acid, Capric, Lauric Acid, Lignoceric Acid	12
4.	*Aloe vera* (L.) Burm. f.	*Ghrita Kumari*	Ghilkanvar	Asphodelaceae	Insect Repellents, Internal Parasite Infestations	Leaf, Whole Plant, Pulp, Root, Flower	Phenolic, Terpenes, Lactones, Volatile Oils, Alkaloids	13
5.	*Anamirta cocculus* (L.) Wight & Arn.	*Kakmari/ Kakadani*	Kakmair	Menispermaceae	Lice Infestation	Fruit	Picrotoxin, Alkaloids, Saponins	14
6.	*Anisomeles malabarica* (L.) R. Br.	*Vaikuntha/ Sprikka*	Chodhara/ Gopoli	Lamiaceae	Insect Repellents	Leaf	Citral, Betulinic Acid, â-sitosterol, Ovatodiolide, Anisomelic Acid, Anisomelolide, Malabaric Acid, 2-Acetoxymalabaric Acid, Anisomelyl Acetate, Anisomelol, Anisomelin	15
7.	*Annona reticulata* L.	*Ramphala*	Ramphal	Annonaceae	Internal Parasite Infestations	Leaf, Fruit	Dopamine, Salsolinol, and Coclaurine, N-Fatty Acyltryptamine	16

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
8.	*Annona squamosa* L.	*Sitaphala*	Sitaphal	Annonaceae	External Parasite Infestations, Insect Repellents, Internal Parasite Infestations, Lice Infestation, Maggot Wounds, Tick Infestation	Seed, Leaf, Root	Annonacin, Anonaine, Asimilobine,	17
9.	*Areca catechu* L.	*Puga*	Supari	Arecaceae	Internal Parasite Infestations	Shoot, Seed	Arecoline, Tannins, Flavonoids	18
10.	*Argemone mexicana* L.	*Svarnakshiri*	Brahmadundi	Papaveraceae	Internal Parasite Infestations	Seed Oil, Latex	Alkaloid Sanguinarine, Dihydrosanguinarine	19
11.	*Aristolochia bracteolata* Lam.	*Dhum rapatra*	Kirmar	Aristol ochiaceaea	Internal Parasite Infestations, Maggot Wounds	Leaf, Seed, Whole Plant	Aristolochic Acids, Aristolactams, Alkaloids	20
12.	*Aristolochia indica* L.	*Ishvari*	Isharmul	Aristolo chiaceae	Internal Parasite Infestations	Leaf, Flower, Whole Plant	Aristolochic Acids, Aristolactams, Alkaloid, Polyphenol, Flavonoid, Terpene	21
13.	*Asparagus racemosus* Willd.	*Shatavari*	Satavari	Asparagaceae	Maggot Wounds	Tuber/ Root, Leaf	Saponins, Flavonoids, Shatavarins, Isoflavone, 8-Methoxy-5,6,4'-Trihydroxyisoflavone 7-O-B-D-Glucopyranoside	22
14.	*Azadirachta indica* A.Juss.	*Nimba*	Neem	Meliaceae	External Parasite Infestations, Insect Repellents, Internal Parasite Infestations, Lice Infestation, Maggot Wounds, Tick Infestation	Leaf, Seed, Fruit, Tender Shoot, Bark, Flower, Seed Oil, Ash	Limonoids, Azadirachtin, Nimbin, Salannin, Quercetin, Alkaloids, Phenolics, Flavonoids Saponins, Tannins	23
15.	*Bacch aroides anthel mintica* (L.) Moench	*Aranyajirak/ Vanajiraka/ Somaraji*	Somraj	Asteraceae	Internal Parasite Infestations	Seed	Sesquiterpene Lactones, Flavonoids, Ernodlin, Vernodalol, and Vernolic Acid, Ernolepin, Vernolin, Vernolide, Vernodalin, and Hydroxyvernodalin	24

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
16.	*Balanites aegyptica* (L.) Delile	*Ingude*	Hingan	Zygophyllaceae	Internal Parasite Infestations	Seed	Saponins, Diosgenin, Alkaloids, Flavonoids	25
17.	*Butea monos perma* (Lam.) Kuntze	*Palasha*	Palas	Fabaceae	Internal Parasite Infestations, Lice Infestations	Flower, Stem Bark, Leaf, Seed	Butrin, Isobutrin, Palasonin Phenolic, Flavonoids, Tannin	26
18.	*Calotropis procera* (Aiton) Dryand.	*Raktarka*	Aak	Apocynaceae	Internal Parasite Infestations	Milky Latex, Leaf, Flower, Root	Cardiac Glycosides (Calotropin, Uscharin), Flavonoids, Triterpenoids, Proteolytic Enzymes - Calotropain	27
19.	*Canarium strictum* Roxb.	*Raal*	Kala Dammar	Burseraceae	External Parasite Infestations	Seed Oil	Triterpenoids (α-amyrin, β-amyrin), Flavonoids, Essential oils	28
20.	*Carica papaya* L.	*Erand akarkati*	Papita	Caricaceae	Internal Parasite Infestations	Fruit, Seed, Pulp, Leaf, Latex	Papain, Benzyl Isothiocyanate, Carpaine	29
21.	*Carissa carandas* L.	*Karamarda*	Karaunda	Apocynaceae	Internal Parasite Infestations	Root	Alkaloids, Flavonoids, Tannins, Sterols, Saponins	30
22.	*Centella asiatica* (L.) Urb.	*Mando okparni*	Brahm amanduki	Apiaceae	External Parasite Infestations	Whole Plant, Leaf, Aerial Parts	Triterpenoid, Asiaticoside, Madecassoside, Tannins, Phlobatannins, Saponins, Flavonoids, Alkaloids, Cardiac Glycosides	31
23.	*Chenop odium album* L.	*Vastuka*	Bethusag	Amaranthaceae	Internal Parasite Infestations	Whole Plant	Saponins, Essential oils, Ascaridole, Camphor, Carvacrol	32
24.	*Chryso phyllum cainito* L.	--	--	Sapotaceae	Internal Parasite Infestations	Stem, Leaf	Flavonoids, Saponins, Alkaloids, Tannins, Terpenoids	33

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
25.	*Cinnamomum camphora* (L.) J.Presl	*Karpur*	Karpur	Lauraceaea	Lice Infestation, Maggot Wounds, Tick Infestation	Exudate, Leaves	Camphor, Safrole, Cineole (Eucalyptol), Cinnamaldehyde, Mannitol, Coumarins, Gum, Tannins, Essential oils (Aldehyde, Eugenol, Pinene)	34
26.	*Citrullus colocynthis* (L.) Schrad.	*Indravaruni*	Indrayan	Cucurbitaceae	Internal Parasite Infestations	Root, Fruit, Leaf	Triterpenoids, Cucurbitacins, Alkaloids, Saponins, Glycosides, Flavonoids	35
27.	*Citrus limon* (L.) Osbeck	*Nimbuphala*	Jambira	Rutaceae	External Parasite Infestations, Internal Parasite Infestations, Maggot Wounds	Fruit	Essential Oils, Limonene, Citral, Flavonoids	36
28.	*Cleome brachycarpa* Vahl ex DC.	*Surajvarta*	Bagra/ Karaliya	Cleomaceae	Maggot Wounds	Leaf	Flavonoids, Baikalin, Apigenin, Loteolin, Alkaloids, Saponins, Tannins, Essential Oils, Polyphenolics	37
29.	*Clerodendrum phlomidis* L.f.	*Agnimantha*	Arni	Lamiaceae	External Parasite Infestations, Insect Repellents, Internal Parasite Infestations, Lice Infestation	Root, Leaf,	Saponins, Alkaloids, Tannins, Flavonoids, Terpenoids	38
30.	*Cocos nucifera* L.	*Narikela*	Nariyal	Arecaceae	Tick Infestation	Tender Coconut Water, Oil, Fruit, Fruit Shell, Inflorescence	Medium-Chain Fatty Acids (Mcfas), particularly Lauric acid, Capric Acid, Caprylic Acid, Catechins, Condensed Tannins, Flavonoids, Steroids	39
31.	*Commiphora wightii* (Arn.) Bhandari	*Guggulu*	Guggul	Burseraceae	Insect Repellents	Leaf, Exudate, Gum, Resin	Guggulsterones, Essential Oils,	40

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
32.	*Cucumis melo* L.	*Koshataki*	Ghiya Tori	Cucurbitaceae	Internal Parasite Infestations	Fruit, Seed	Cucurbitacin, Flavonoids, Phenolic Acids, Saponins	41
33.	*Cullen corylifolium* (L.) Medik.	*Bakuchi*	Babchi	Fabaceae	External Parasite Infestations	Seed	Psoralen, Bakuchiol, Flavonoids, Coumarins	42
34.	*Curcuma longa* L.	*Haridra*	Haldi	Zingiberaceae	External Parasite Infestations, Tick Infestations	Tuber/ Rhizome, Leaf, Oil	Curcumin, Demethoxycurcumin, Bisdemethoxycurcumin, Essential oils (Turmerone, Curlone), Alkaloids, Saponins, Flavonoids, Terpenes, Steroids	43
35.	*Cuscuta reflexa* Roxb.	*Amaravalli*	Akashbel	Convolvulaceae	Internal Parasite Infestations	Whole Plant	Cuscutine, Alkaloids, Flavonoids, Steroids, Saponins, CardiacGlycosides, Phenols, Tannin, Anthraquinone Glycosides	44
36.	*Cyanthillium cinereum* (L.) H.Rob.	*Sahadevi*	Sahadevi	Asteraceae	Internal Parasite Infestations	Whole Plant with Small Flowers, Leaf, Seed	Flavonoids, Triterpenoids, Steroids, Phenolic compounds	45
37.	*Delonix regia* (Bojer ex Hook.) Raf.	-	Gulmohr	Fabaceae	Internal Parasite Infestations	Flower, Leaves	Flavonoids, Tannins, Anthocyanins, Saponins, Alkaloids	46
38.	*Diospyros mollis* Griff.	-	-	Ebenaceae	Internal Parasite Infestations	Fruit	Diospyrol, Plumbagin, Flavonoids, Tannins, Saponins	47
39.	*Dysphania ambrosioides* (L.) Mosyakin & Clemants	*Sugand havastuka*	Bathua Chillishak	Amaranthaceae	Internal Parasite Infestations	Fruit, Bark, Whole Plant	Ascaridole, Isoascaridole, P-Cymene, Terpenoids, Anthraquinones, Tannins, Saponins, Flavonoids, Alkaloids, Cardiac Glycosides	48

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
40.	*Echinops echinatus* Roxb.	*Kantalu*	Utakanta	Asteraceae	Lice Infestation, Maggot Wounds	Whole Plant, Root, Fruit	Flavanol Glycoside Kaempferol, Kaempfe, Flavonoids, Saponins, Alkaloids, Tannins, Phenolic Compounds	49
41.	*Embelia ribes* Burm.f.	*Vidanga*	Barberang	Primulaceae	Internal Parasite Infestations	Fruit, Seed	Embelin, Flavonoids, Tannins	50
42.	*Enicostema axillare* (Poir. ex Lam.) A. Raynal	*Nagajivha*	Chota Chirayta	Gentianaceae	Internal Parasite Infestations	Whole Plant	Tannins, Saponins, Flavonoids, Alkaloids	51
43.	*Ficus benghalensis* L.	*Vata*	Bargad/Bor	Moraceae	Maggot Wounds	Stem Bark, Seed, Leaf, Latex	Tannins, Saponins, Flavonoids, Alkaloids, Amino acids, Steroids	52
44.	*Ficus carica* L.	*Falgu*	Anjir	Moraceae	Internal Parasite Infestations	Milky Juice of Fruit	Ficin, Flavonoids, Tannins, Saponins	53
45.	*Fumaria officinalis* L.	*Parpata*	Pit-Papara	Papaveraceae	Internal Parasite Infestations	Stem, Leaf	Fumaric acid, Alkaloids, Flavonoids (Quercetin, Kaempferol, Triterpenes	54
46.	*Gardenia gummifera* L.f.	*Nadihingu*	Dikamali	Rubiaceae	Internal Parasite Infestations	Exudate from Fruit	Pyrvinium, Gardenoside, Geniposide, Iridoids, Flavonoids	55
47.	*Hydno carpus pentandrus* (Buch.-Ham.) Oken	*Tuvaraka*	Chaulmoogra	Achariaceae	External Parasite Infestations	Fruit, Oil	Pachyrrhizine, Hydnocarpic Acid, Cyclopentenyl Fatty Acids, Hydnocarpin (Flavonolignans), Saponins, Sterols, Flavonoids	56
48.	*Leucas aspera* (Willd.) Link	*Dronpushpi*	Chotahalkusa	Lamiaceae	External Parasite Infestations, Lice Infestation, Maggot Wounds, Tick Infestation.	Leaf, Flower, Steam, Bark, Whole Plant	Linalool, Eugenol, Flavonoids, Terpenes	57

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
49.	*Madhuca longifolia* (L.) J.F.Macbr.	*Madhuka*	Mahua	Sapotaceae	Lice Infestation	Bark, Oil Cake, Whole Plant, Flower	Madhucaol, Madhucol, Saponins, Tannins, Flavonoids, Triterpenes	58
50.	*Magnolia champaca* (L.) Baill. ex Pierre	*Champaka*	Champa	Magnoliaceae	Maggot Wounds	Bark	Magnolol, Honokiol, Lignan, Octadecadienoate Derivatives, Flavonoids	59
51.	*Melia azedarach* L.	*Mahanimba*	Bakain	Meliaceae	Internal Parasite Infestations	Leaf, Flower, Gum, Fruit, Seed Oil	Tannins, Azadirachtin, Melianol, Melianone, Quercetin	60
52.	*Mimosa pudica* L.	*Lajjalu*	Chuimui	Fabaceae	Internal Parasite Infestations	Leaf, Roots, Seed, Stem, Twig, Whole Plant	Tannins, Flavonoids, Alkaloids, Saponins	61
53.	*Momordica charantia* L.	*Karavellaka*	Karela	Cucurbitaceae	Internal Parasite Infestations	Leaf, Fruit, Seed, Stem	Flavonoid, Quercetin, Charantin, Momordicin, Saponins, Alkaloids,	62
54.	*Moringa oleifera* Lam.	*Shigru*	Soanjana	Moringaceae	Internal Parasite Infestations	Fruit, Seed, Leaf, Root, Flower, Bark	Moringin, Moringa Oil, Flavonoids, Phenolic Acids, Tannins, Saponins	63
55.	*Mucuna pruriens* (L.) DC.	*Kapika chchhu*	Kawanch	Fabaceae	Internal Parasite Infestations	Root, Seed, Aerial Part, Pods	L-Dopa, Tannins, Saponins, Flavonoids	64
56.	*Musa paradisiaca* L.	*Kadali*	Kela	Musaceae	External Parasite Infestations, Internal Parasite Infestations	Leaf, Blos som, Stem, Fruit, Root	Saponins, Flavonoids, Tannins, Alkaloids	65

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
57.	*Nerium oleander* L.	*Karavira*	Kaner	Apocyanaceae	External Parasite Infestations	Flower, Root, Bark	Oleandrin, Neriifolin, Oleandroside, Cardiac glycosides, Alkaloids, Flavonoids, Steroids, Glycosides, Tannins	66
58.	*Nicotiana tabacum* L.	*Tamakhu/ Tamrap arna/ Dhumr patra*	Tambakhu	Solanaceae	Internal Parasite Infestations, Lice Infestation, Maggot Wounds, Tick Infestation	Leaf	Nicotine, Anabasine, Anatabine, Nornicotine, Saponins, Alkaloids	67
59.	*Nigella sativa* L.	*Upak unchika*	Kalajira	Ranunculaceae	External Parasite Infestations	Seed	Thymoquinone, Thymol, Palmitic Acid, Carvacrol, Nigellidine, Linoleic, Oleic Acid	68
60.	*Ocimum basilicum* L.	*Bisva Tulasi*	Babui Tulsi	Lamiaceae	Internal Parasite Infestations	Leaf, Whole Plant	Eugenol, Linalool, Thymol, Rosmarinic Acid, Alkaloids, Diterpenes, Favonoids, Glycosides, Phenols, Steroids, Tannins, Terpenoids	69
61.	*Ocimum tenuiflorum* L.	*Tulasi*	Tulsi	Lamiaceae	Maggot Wounds	Whole Plant, Leaf, Stem Bark, Seed	Eugenol, Ursolic Acid, Rosmarinic Acid, Flavonoids	70
62.	*Oryza sativa* L.	*Shali*	Dhan	Poaceae	Maggot Wounds	Seed	Saponins, Flavonoids, Phenolic Acids, Tannins	71
63.	*Pergularia daemia* (Forssk.) Chiov.	*Yugaphala/ Uttamaarani*	Utran	Apocynaceae	External Parasite Infestations, Insect Repellents, Internal Parasite Infestations	Leaf, Whole Plant	Pergularin, Flavonoids, Alkaloids, Saponins, Tannins, Phenolic compounds	72
64.	*Piper betle* L.	*Nagavalli*	Pan	Piperaceae	Internal Parasite Infestations	Leaf	Eugenol, Hydroxychavicol, Carvacrol, Betel-phenol, Piperine, Essential Oil	73

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
65.	*Piper nigrum* L.	*Maricha*	Kalimirch	Piperaceae	Internal Parasite Infestations	Immature Berries, Stem, Root, Fruit, Leaf	Piperine, Piperidine, Alkaloids, Essential Oils	74
66.	*Pongamia pinnata* (L.) Pierre	*Karanja*	Karanja	Fabaceae	Lice Infestation, Maggot Wounds	Bark, Seed, Oil, Stem	Karanjin, Pongamol, Flavonoids, Saponins, Steroids, Isoflavonoids, Alkanes, Alkenes	75
67.	*Punica granatum* L.	*Dadim*	Anar	Lythraceae	Internal Parasite Infestations	Leaf, Fruit, Root Bark, Stem Bark	Punicic Acid, Ellagic Acid, Tannins, Alkaloids	76
68.	*Ricinus communis* L.	*Eranda*	Arandi	Euphorbiaceae	Internal Parasite Infestations, Tick Infestation	Seed, Oil, Leaf	Ricin, Stigmasterol, β-Sitosterol, Methyl Linoleate, Ricinoleic Acid, Alkaloids, Flavonoids, Saponins	77
69.	*Saccharum officinarum* L.	*Ikshu*	Ganna	Poaceae	Internal Parasite Infestations	Stem, Leaf	Saponins, Alkaloids, Flavonoids, Phenolic Acids, Flavones (Luteolin, Apigenin, Tricin derivatives), Caffeic, Hydroxycinnamic, Sinapic Acids	78
70.	*Senegalia catechu* (L.f.) P.J.H. Hurter & Mabb.	*Khadira*	Khair	Fabaceae	External Parasite	Bark, Heart Wood, Solid Sap	Catechin, Epicatechin, Tannins, Saponins, Flavonoids, Phenolic compounds	79
71.	*Senna alexandrina* Mill.	*Sonamukhi/ Kalyani*	Sona-ka-pat	Fabaceae	Internal Parasite Infestations	Leaf, Pod	Sennosides, Flavonoids, Anthraquinones, Tannins, Phenols	80
72.	*Senna auriculata* (L.) Roxb.	*Avartaki*	Tarwar	Fabaceae	Internal Parasite Infestations	Leaf	Sennosides, Flavonoids, Tannins, Saponins, Polyphenolic compound	81

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
73.	*Sesamum indicum* L.	*Tila*	Til	Pedaliaceae	External Parasite Infestations, Maggot Wounds	Seed, Oil	Sesamin, Sesamol, Sesamolin, Flavonoids, Lignans, Alkaloids, Glycosides, Tannins	82
74.	*Solanum virginianum* L.	*Kantakari*	Kateli	Solanaceae	External Parasite Infestations	Fruit, Leaf	Solamargine, Solasonine, Solanine, Alkaloids, Tannin, Flavonoids (Quercetin, Apigenin, Luteolin, Fisetin)	83
75.	*Soymida febrifuga* (Roxb.) A. Juss.	*Mansarohini*	Rohun	Meliaceae	Internal Parasite Infestations	Stem Bark	Saponins, Flavonoids, Alkaloids, Tannins, Glycosides, Steroids, Phenolics	84
76.	*Strychnos nux-vomica* L.	*Kupilu/ Kuchala*	Kuchla	Loganiaceae	Maggot Wounds	Seed, Root, Bark, Leaf	Alkaloids, Strychnine, Brucine	85
77.	*Tagetes erecta* L.	*Sthu lapushpa*	Genda	Asteraceae	Maggot Wounds, Tick Infestation	Leaf, Flower	Lutein, Zeaxanthin, Thiophenes Butene-nylbithiophene, Alpha-terthienyl, Tagetin, Flavonoids	86, 87
78.	*Tamarindus indica* L.	*Chincha*	Imli	Fabaceae	Internal Parasite Infestations	Leaf, Bark, Fruit	Tannins, Tamarindin, Flavonoids, Tartaric Acid, Alkaloids	88
79.	*Tanacetum cinerariifolium* Sch. Bip.	--	Safed Phool	Asteraceae	Insect Repellents	Flower	Pyrethrins, Cinerin, Jasmolin	89
80.	*Tinospora crispa* (L.) Hook. f. & Thomson	*Patalgarudi*	Faridbel	Menispermaceae	Internal Parasite Infestations	Stem, Mature Vine, Fruit	Tinosporide, Berberine, Alkaloids, Glycosides, Furanoditerpenes, Lactones, Steroids, Flavonoids, Lignans	90
81.	*Trachyspermum ammi* (L.) Sprague	*Yavani*	Ajowan	Apiaceae	Internal Parasite Infestations	Seed, Fruit, Root	Thymol, γ-Terpinene, Carvacrol, Flavonoids, Saponins, Essential oil	91
82.	*Urtica dioica* L.	*Vrishchiya Shaka*	Bichu	Urticaceae	Internal Parasite Infestations	Root, Leaf	Flavonoids, Tannins, Sterols, Lectins, Phenolic Acids, Diterpenoid	92

Table 1. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Ethno-veterinary Uses for the treatment of parasites in Animals	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
83.	*Vitex negundo* L.	*Nirgundi*	Nirgandi	Lamiaceae	External Parasite Infestations, Insect Repellent, Internal Parasite Infestations	Leaf	Vitexin, Apigenin, Luteolin, Terpenoids, Alkaloids, Tannins, Flavonoids, Betulinic Acid, Ursolic Acid	93
84.	*Wrightia antidysenterica* (L.) R. Br.	*Kutaja*	Kurchi	Apocynaceae	Internal Parasite Infestations	Whole Plant, Stem, Bark, Fruit, Leaf, Seed	Triterpenoids, Glycoside, Wrightialactone, Flavonoids, Saponins	94
85.	*Wrightia tinctoria* R.Br.	*Kutaja*	Indrajau	Apocynaceae	External Parasite Infestations	Bark, Seed	Wrightiamine, Wrightiaflavone, Flavonoids, Alkaloids	95
86.	*Zingiber officinale* Roscoe	*Shunthi*	Adrak	Zingiberaceae	Internal Parasite Infestations	Rhizome	Gingerol, Shogaol, Zingerone, Curcumin, Hexahydrocurcumin,	96

practice has been gathered through the vigilant study of *Ayurveda*, veterinary and folk medicine literature along with numerous published scientific research articles[9]. After review, various plants used for treating parasitic infestations in livestock are listed in Table 1.

3. Results and Discussion

Parasitic symbiosis, a relationship in which parasites thrive at the expense of their host, poses significant challenges to livestock health and productivity. Parasitic infestations can lead to reduced growth, poor nutritional absorption and lower yields in dairy farming. Addressing these infestations is crucial and traditional knowledge, particularly through ethno-veterinary medicinal plants, offers promising solutions for sustainable and effective management. Upon review, the most commonly reported parasitic diseases in livestock include external and internal parasite infestations, lice, maggot wounds and tick infestations. Among them, the internal parasite infestations appear the most common, followed by external parasite infestations and maggot wounds in livestock. A total of 86 plant species representing 42 plant families and were found significant in the treatment of parasitic diseases in livestock. Among these 86 plants, 8 belong to family Fabaceae, 6 belongs to Lamiaceae, 5 of each belongs to Asteraceae, Apocynaceae, 3 of each to Meliaceae, Amaranthaceae, Cucurbitaceae (Figure 1). Other families appear once or twice.

It was found that leaf, whole plant, seed, fruit, root, flower, stem, bark, oil, latex, exudate pulp, shoot, tuber/root, milky juice, gum, rhizome, pod, ash, twig, heartwood, solid sap, blossom, tender coconut water, inflorescence and vine were used in the treatment of parasitic infestation. Leaf is the most frequently used plant part, followed by the whole plant, seeds and fruits (Figure 2).

Under the literature of *Ayurveda*, in *Charaka Samhita* (Indian ancient traditional medicine textbook), there are some great options/herbs available that may serve more benefits too. These medicinal herbs are organized into 50 groups known as *Mahakashaya*, *Gana* or *Dashemani*, each comprising 10 herbs[97]. Notably, among these groups, the herbs categorized as (A) *Krimighna Mahakashaya* (having antimicrobial or anthelmintic properties), (B) *Kushthaghna Mahakashaya* (treat skin

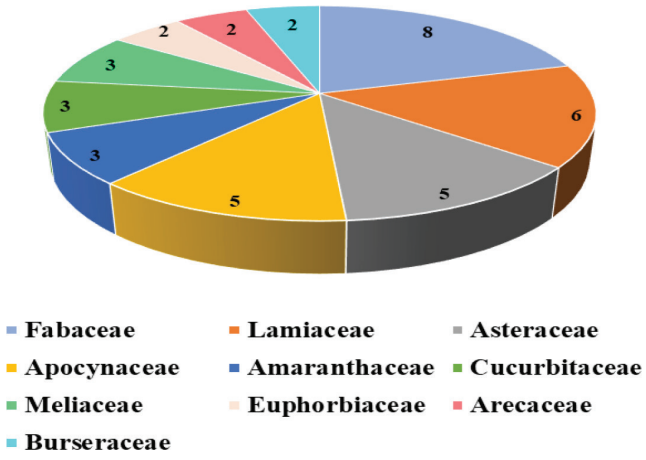


Figure 1. Distribution of plant families used in parasitic infestation management.

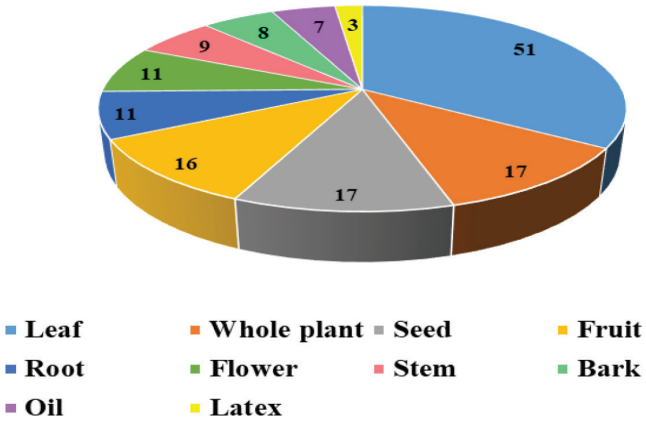


Figure 2. Distribution of plant parts used in parasitic infestation management.

diseases), (C) *Kandughna Mahakashaya* (antipruritic/pacifying itching), (D) *Vishaghna Mahakashaya* (having anti-toxic effect against microbes) are recommended for experimental incorporation into parasitic diseases (Table 2). *Acharya Chakrapani's* commentary on *Charaka Samhita* stated that the number of herbs, only ten in each group (*Mahakashaya*) is not limiting but indicative, allowing for the inclusion of other herbs from other groups with similar properties and actions when needed. In ancient tradition, the number ten is referred to as *'Dika'* (direction), signifying guidance. *Acharya Charaka's* aim in developing the concept of *Mahakashaya* was to facilitate the formulation of various treatments using a collection of substances with similar properties. These combinations were specifically intended for those with lower intellectual capacity and for those who are unable to create their own formulations. Also, it is indicated that, according to the need, the herbs from these individual groups may be used individually or as the bare minimum available species or as a complete combination by taking them in *Samabhaga* (equal proportion) as a compound formulation in pharmaceutical preparation. The term *Kashaya* means *Kwatha*[98] (decoction) as suggested in ancient texts[99]. Using the methods of decoction, these *Mahakashaya* are utilized to prepare extracts from combinations of herbs. These extracts can be introduced into the livestock diseases to treat parasitic infestations. This aspect requires further research in the future.

The *Dravya* (medicinal substances) under *Krimighna Mahakashaya* are recognised for eliminating internal and external parasites. These plants have been categorised based on their mechanism of action into two groups: (a) *Antahkrimighna* (Endoparasiticidal), which targets internal parasites, particularly those residing in the intestines. They work either by killing the parasites or rendering them immobile, (b) *Bahyakrimighna* (Ectoparasiticidal), which act against external parasites. The *Dravya* of *Kushthaghna* (skin disease alleviators) *Mahakashaya* primarily target *Raktadushti* (impurities in the blood) and is effective in alleviating skin disorders. While most drugs in this category exhibit *Vyadhipratyanika* (anti-disease) properties, their efficacy is also influenced by the *Prabhava*[132] (specific potency) of the drug. In the context of *Kandughna Mahakashaya*, the *Dravya* are effective in alleviating pruritus (itching). Itching occurs due to the aggravation of *Kapha Dosha*, which becomes localized in the skin or membranes, leading to the manifestation of *Kandu* (itching). The *Kandughna Dravya*, through their *Kaphashamaka* (Kapha-pacifying) properties, are particularly beneficial in managing pruritus caused by parasitic infestations and play a significant role in maintaining healthy skin. Furthermore, the *Dravyas* of *Vishaghna Mahakashaya* exhibit antitoxic effects by removing and neutralizing toxins in the body at the cellular level. According to pharmacological principles, *Vishaghna Mahakashaya* possesses antibacterial, antifungal and antihistaminic properties, which can combat microbial manifestations and their toxic effects.

While natural remedies hold promise for mitigating parasitic infestations, challenges such as the standardization of plant-based formulations,

Table 2. Group of herbs under *Mahakashaya* of *Charaka Samhita*

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Can be Used in	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
(A)	***Krimighna Mahakashaya*** (group of 10 herbs having antimicrobial or anthelmintic properties)[100]							
1.	*Moringa oleifera* Lam.	*Akshiva*	Shigru/ Shahinjan	Moringaceae	Described earlier			
2.	*Piper nigrum* L.	*Maricha*	Kalimirch	Piperaceae	Described earlier			
3.	*Euphorbia antiquorum* L.	*Gandira*	Snuhi Bhed	Euphorbiaceae	Maggot Wounds, External Parasite Infestations	Latex	Euphorbin, Ingenol, Euphol, Triterpenes, Flavonoids, Phytosterols	[101]
4.	*Hellenia speciosa* (J.Koenig) S.R.Dutta	*Kebuka*	Kemuk	Costaceae	External Parasite Infestations, Insect Repellents, Tick Infestation	Rhizome	Alkaloids, Flavonoids, Saponins, Tannins, Cardiac Glycosides, Sterols	[102]
5.	*Embelia ribes* Burm.f.	*Vidanga*	Baiyvidang	Primulaceae	Described earlier			
6.	*Vitex negundo* L.	*Nirgundi*	Sindhuvaar	Lamiaceae	Described earlier			
7.	*Achyranthes aspera* L.	*Kinihi*	Apamarga/ Latjeera	Amaranthaceae	Described earlier			
8.	*Tribulus terrestris* L.	*Shwadanstra*	Gokshur	Zygophyllaceae	Internal Parasite Infestations, Insect Repellents, Lice Infestation, Tick Infestation	Root, fruit	Sitosterol-D-glucoside, Tribulosin, Saponins, Alkaloids, Flavonoids	[103]
9.	*Merremia emarginata* Hallier f.	*Aakhuparnika*	Musakarni	Convolvulaceae	External Parasite Infestations, Lice Infestation, Tick Infestation	Whole plant	Caryophyllene Oxide, Phytol, Stigmasterol, Beta-Sitosterol, Alkaloids, Saponins, Flavonoids, Terpenoids.	[104]
10.	*Merremia emarginata* Hallier f. variety	*Vrishaparni*	Musakarni bhed	Convolvulaceae	Described earlier			
(B)	***Kushthaghna Mahakashaya*** (group of 10 herbs treating skin diseases)[105]							

Table 2. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Can be Used in	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
1.	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	*Khadira*	Katha	Fabaceae	Described earlier			
2.	*Terminalia chebula* Retz.	*Abhaya*	Harre	Combretaceae	Internal Parasite Infestations, Lice Infestation, Maggot Wounds	Fruit	Tannins, Ellagic Acid, Gallic Acid, Saponins	106
3.	*Phyllanthus emblica* L.	*Aamalaki*	Amla	Phyllanthaceae	Internal Parasite Infestations, Insect Repellents, Lice Infestation	Fruit, Seeds, Leaf	Ellagic Acid, Gallic Acid, Flavonoids, Tannins	107
4.	*Curcuma longa* L.	*Haridra*	Haldi	Zingiberaceae	Described earlier			
5.	*Semecarpus anacardium* L.f.	*Arushkara*	Bhallatak/ Bhilava	Anacardaceae	External parasite infestations, Insect repellents, Lice infestation, Tick infestation	Nuts, Oil, Flowers	Brosimacrin, Semecarpusins, Anacardic Acid, Flavonoids	108
6.	*Alstonia scholaris* (L.) R.Br.	*Saptaparna*	Chitvan	Apocynaceae	External Parasite Infestations, Insect Repellents, Internal Parasite Infestations, Lice Infestation, Maggot Wounds, Tick Infestation	Bark, Latex, Flower, Leaf	Alkaloids, Triterpenoids, Flavonoids, flavonoidal glycosides Saponins	109
7.	Cassia fistula L.	*Aaragwadha*	Amaltas	Fabaceae	External parasite infestations, Internal parasite infestations, Lice infestation, Tick infestation.	Fruit-Pulp, Root-bark, leaves	Flavonoids, Tannins, Lectins, Saponins Anthraquinones, Sennosides	110
8.	*Nerium oleander* L.	*Karavira*	Kaner	Apocynaceae	Described earlier			

Table 2. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Can be Used in	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
9.	*Embelia ribes* Burm.f.	*Vidanga*	Vaividanga	Primulaceae	Described earlier			
10.	*Jasminum officinale* L.	*Jati Pravala*	Chameli	Oleaceae	Insect Repellents, Lice Infestation, Tick Infestation	Leaves, Flower, Root	Alkaloids, Flavonoids, Saponins	[111]
(C)	***Kandughna Mahakashaya*** (group of 10 herbs having antipruritic properties/pacifying itching)[112]							
1.	*Santalum album* L.	*Chandana*	Chandan	Santalaceae	Insect Repellents, Lice Infestation, Tick Infestation	Heart wood, oil	α and β - Santalols, Santalins, Santalone	[113]
2.	*Nardostachys jatamansi* (D.Don) DC.	*Nalada*	Jatamansi/ Bhutajata	Caprifoliaceae	Insect repellents, Lice infestation, Tick infestation	Rhizome	Jatamansone, Nardol, Nardostachysin, Lignans, Sesquiterpenes, Essential Oils	[114]
3.	*Cassia fistula* L.	*Kritamala*	Aragvadha/ Amaltas	Fabaceae	Described earlier			
4.	*Pongamia pinnata* (L.) Pierre	*Naktamala*	Karanj/ Sukhchian	Fabaceae	Described earlier			
5.	*Azadirachta indica* A.Juss.	*Nimba*	Neem	Meliaceae	Described earlier			
6.	*Holarrhena pubescens* Wall. & G.Don	*Kutaja*	Kutaj/ Kurchi	Apocynaceae	Insect Repellents, Lice Infestation, Tick Infestation, Internal Parasite Infestations	Bark, seed	Conessine, Conessinol, Holarrhenine, Alkaloids	115
7.	*Brassica rapa* L.	*Sarshapa*	Sarsoon	Brassicaceae	External parasite infestations, Insect repellents, Internal parasite infestations, Lice infestation, Tick infestation	Seed	Carotenoids, Phenolics, Progoitrin, Flavonoids, Phytic Acid	116
8.	*Glycyrrhiza glabra* L.	*Madhuka*	Mulethi	Fabaceae	Insect Repellents, Lice Infestation, Tick Infestation	Root and stolon	Glycyrrhizin, Glycyrrhizinic Acid, Glabrin A and B, Isoflavones	117

Table 2. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Can be Used in	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
9.	*Berberis aristata* DC.	*Daruharidra*	Daruhaldi	Berberidaceae	External parasite infestations, Internal parasite infestations, Lice infestation, Maggot wounds, Tick infestation.	Root	Berberine, Berberastine, Quinones, Phenolic Acids, Alkaloids, Saponins, Terpenoids, Tannins	118
10.	*Cyperus rotundus* L.	*Mustaka*	Musta	Cyperaceae	Internal parasite infestations, Insect repellents	Tubers	Cyperone, Cyperotundone, Flavonoids, Essential Oils, Terpenoids, Saponins, Steroids, Alkaloids	119
[D]	***Vishaghna Mahakashaya*** (group of 10 herbs having antitoxic activity against microbes)[120]							
1.	*Curcuma longa* L.	*Haridra*	Haldi	Zingiberaceae	Described earlier			
2.	*Rubia cordifolia* L.	*Manjishtha*	Mulethi	Rubiaceae	External Parasite Infestations, Maggot Wounds	Root	Anthraquinones, Flavonoids, Tannins, Mangistin, Alizarin, Garancin, Mollugin, Furomollugin	121, 122
3.	*Pluchea lanceolata* (DC.) C.B.Clarke	*Suvaha*	Rasna	Asteraceae	Insect Repellents, Tick Infestation	Root	Flavonoids, Sesquiterpene Lactones, Essential Oils, Pluchine, Quercetin, Isohamnetin, Hesperidin	123
4.	*Elettaria cardam omum* (L.) Maton	*Ela*	Elaichi	Zingiberaceae	Internal Parasite Infestations	Seed	Essential oils, Flavonoids, Tannins, Pinene, Sabinene, Myrcene, Limonene	124, 125
5.	*Operculina turpethum* (L.) Silva Manso	*Palindi/ Trivrutta*	Nishoth	Convolvulaceae	Internal Parasite Infestations	Root, Root bark	Alkaloids, Saponins, Triterpenoids, Phenolic Compounds, Turpethic Acids	126, 127

Table 2. Continued...

S. No.	*Latin* Name	*Sanskrit* Name	Hindi Name	Family	Can be Used in	Part Used	Phytochemicals Associated with Antiparasitic Activity	Reference
6.	*Santalum album* L.	*Chandana*	Chandan	Santalaceae	Described earlier			
7.	*Strychnos potatorum* L.f.	*Kataka*	Nirmali/ Chillur	Loganiaceae	Internal Parasite Infestations, Lice Infestation	Seed	Saponins, Alkaloids, Glycosides, Brucine	128
8.	*Albizia lebbeck* (L.) Benth.	*Shirisha*	Siris	Fabaceae	Insect Repellents, Lice Infestation	Bark, Leaf, Seed	Flavonoids, Triterpenoids, Saponins, Tannins	129
9.	*Vitex negundo* L.	*Sindhuvaar*	Nirgundi	Lamiaceae	Tick Infestation, Insect Repellents, Lice Infestation	Leaf, Root, Seed	Flavonoids, Terpenoids, Essential Oils, Malic Acid	130
10.	*Cordia dichotoma* G.Forst.	*Shleshmataka*	Lasoda/ Gondi	Boraginaceae	Maggot Wounds	Fruit	Flavonoids, Tannins, Saponins, Phenolic compounds, Quercetin	131

dosage determination, and regulatory approval must be addressed. This section explores these challenges and proposes collaborative efforts between traditional knowledge holders, *Vaidyas* (*Ayurveda* practitioners), veterinarians, and researchers to develop evidence-based guidelines for incorporating ethno-veterinary practices into livestock healthcare management. In the quest for sustainable parasitic infestation management, we propose avenues for future research, including interdisciplinary collaborations, pharmacological investigations, and the integration of EVM practices into conventional veterinary protocols. Emphasizing the importance of a holistic approach, we advocate for the preservation and adaptation of traditional knowledge to address contemporary challenges in veterinary and animal sciences. This review highlights the promise of ethno-veterinary plants in reducing various parasite infections. By integrating ancient knowledge with modern scientific findings, our goal is to spur further exploration and discussion, advancing the creation of efficient and eco-friendly approaches to livestock healthcare traditions.

4. Summary and Conclusion

This review highlights the identification of over 86 plants from 42 different families, detailing the specific plant parts utilized in ethno-veterinary practices in India. It also emphasizes the phytochemicals likely responsible for their antiparasitic effects, supported by scientific research that validates their efficacy and the benefits they offer. On review, internal parasite infestations appear the most common in livestock. Out of 42 plant families, plants of the Fabaceae family were found more in this review. Leaf is the most frequently used plant part, followed by the whole plant, seeds and fruits. Among the phytochemicals, flavonoids followed closely by saponins, alkaloids, and tannins probably responsible for the antiparasitic activity of these herbs. Moreover, essential oils including compounds like eugenol, thymol and citral, are commonly associated with antiparasitic effects. *Mahakashaya* (a group of herbs) mentioned in *Ayurveda* synthesizes traditional wisdom with contemporary scientific evidence to advocate for further research and dialogue. *Krimighna and Vishaghna Mahakashaya* can be

used for both internal and external parasitic infestations, while *Kushthaghna* and *Kandughna Mahakashaya* are suitable for external applications. It underscores the potential of herbal therapies to develop effective and sustainable parasite infestation control strategies.

The present review may be concluded that plant-based remedies are highlighted for their ability to reduce production losses and veterinary costs of parasitic infestation proving their therapeutic significance for livestock and dairy farmers. The integration of ancient knowledge with modern scientific findings presents promising avenues for addressing parasitic infestation in animals. Further research in this area will be crucial to harness the full potential of alternative therapies in parasite management.

5. Acknowledgements

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