Livestock is the main backbone of the rural economy of an agriculture-based country like India. To mitigate the economic loss due to livestock’s poor performance and illness, folk phytotherapy for livestock healthcare is still actively practiced in India. Literature survey revealed that the laterite region of eastern India, characterized by its cultural, ethnic, and biological diversities, as well as topographical uniqueness, lacks comprehensive information on ethnoveterinary medicinal knowledge. The objective of the present study includes documentation of traditional knowledge of ethnoveterinary medicine (EVM) from the northern laterite region in eastern India. Ethnoveterinary medicinal data were collected using a semi-structured questionnaire, free listing, and focus group discussions. The factor for informants’ consensus (Fic), fidelity level (FL), and cultural value (CV) index have been employed for quantitative analyses. Jaccard index (JI) was used to check the knowledge similarity. Altogether, 1,234 citations were made by 132 participants. In total, 232 recorded ethnomedicinal species are used for preparing 306 remedies to treat 79 health disorders of livestock. Recorded species are distributed in 92 families, and Fabaceae is identified as the most medicinally diversified. Uses of 24 angiospermic taxa, one pteridophyte, and two fungal species were exclusively new to the existing inventory of Indian traditional ethnoveterinary medicine. In 20 disease categories, the informant consensus (Fic) value ranges from 0.4 to 0.83. According to the FL value and use-mention factor, 23 EVM plants have been identified as the most important species in the respective disease categories. Value of CV index highlighted nine species as culturally most significant (CV ≥ 0.0025 and frequency of citation ≥ 20) in the laterite region of eastern India. A large extent of recorded data are quite worthy for the Indian folk veterinary medicinal repository. A handful of new data reported here and statistically justified culturally most significant species will provide the golden opportunity for bioprospecting research.

Keywords: ethnoveterinary medicine, livestock disease, quantitative ethnobotany, cultural value, Eastern India
1 INTRODUCTION

From the beginning of human civilization, the need for animal domestication was realized by the ancient people in every step of their shifted livelihood from hunting to farming. Over the past 11,000 years, varieties of animals have been domesticated by humans for food, secondary products, labor, and companionship (Ahmad et al., 2020; Cucchi and Arbuckle, 2021). Simultaneous developments of traditional healthcare management systems for domesticated animals have been shaped according to the continuous evolution of knowledge, culture, and local biodiversity. Traditional knowledge associated with the healthcare management of livestock is the basis of ethnoveterinary medicine (EVM). It includes people’s understanding, expertise, approach, way of application, and faith. Documentation of this age-old non-codified traditional knowledge for its larger prospects and academic interest has revolved around the wheel of research in ethnobotany that deals with the multidisciplinary approach of people–plant interactions (Gomez-Beloz, 2002). In the last three decades, many scientific articles on ethnoveterinary medicine have been published from different parts of the world (Yineger et al., 2007; Shen et al., 2010; Zia-ud-Din et al., 2010; Aziz et al., 2018; Erarslan and Kültür, 2019; Chakale et al., 2021), indicating the growing interest of the researchers in this field of ethnomedicine.

In India, the tradition of livestock rearing is prehistoric and sacrosanct. To date, livestock plays a vital role in shaping the rural economy by providing livelihood to two-thirds of rural communities, mainly the landless daily laborers, marginal and small-scale farmers, and women (Mutua et al., 2020).

Societal acceptance, emotional attachment, and economic benefit of the domesticated animals lay the foundation of livestock healthcare management in India long before the Vedic age (Somvanshi, 2006). From the very beginning, local biodiversity contributes immensely to India’s folk veterinary medicinal practices. Preparation of databases on ethnoveterinary medicinal knowledge and documentation of related medicinal plants in India are getting priority for its better scientific exploitation, resulting in a vast repository of research and review articles, thesis, and books on this subject (Jain, 1999; Pande et al., 2007; Dey and De, 2010; Galav et al., 2013; Bharali et al., 2015; Khandelwal, 2017). For ethnoveterinary data collection, focuses have been made on a particular ethnic group (Gaur et al., 2010; Kumar et al., 2012; Rajkumari et al., 2014), specific geographical area (Bharati and Sharma, 2010; Lakshminarayana and Rao, 2013; Manoranjitham and Kamaraj, 2016), particular animal group (Das, 2011; Sharma et al., 2012; Shrivastava et al., 2012; Jayakumar et al., 2017), and specific disease or ailments conditions (Mishra, 2013; Chouhan and Ray, 2015).

In West Bengal, a state of eastern India, scientific documentation of medicinal plants and related traditional knowledge has primarily been focused on ethnomedicine of human importance (Rahaman and Saha, 2011; Mondal and Rahaman, 2012; Banerjee et al., 2013; Das and Rahaman, 2014; Chaudhury et al., 2017). Phytotherapeutic knowledge of veterinary importance, traditional practitioners of veterinary medicine, and their role in primary healthcare for veterinary diseases and ailments have been overlooked initially. The documentation of ethnoveterinary medicines in West Bengal started much later, resulting in sporadic and scanty knowledge documentation (Pal, 1980; Mandal and Chauhan, 2000; Ghosh, 2003; Bandyopadhyay and Mukherjee, 2005; Mandal and Rahaman, 2014; Saha et al., 2014). Specifically, few reports on ethnoveterinary medicine have been published from districts such as Bankura, Midnapore, Purulia, Birbhum, and Bardwan, which comprise the laterite region of West Bengal (Mukherjee and Namahata, 1988; Rahaman et al., 2009; Dey and De, 2010; Mandal and Rahaman, 2016). A perusal of literature indicates a potential lack of ethnoveterinary medicinal information in this area.

In the laterite region of West Bengal, a large section of the local people mostly depends on mixed crop cultivation and livestock rearing. In this socio-economic spectrum, livestock plays a definite role in balancing the core economy of this area. Livestock keepers are concerned about the healthcare of their mute animals and mobilize themselves for innovating their ways of keeping these animals healthy.

Government-supported livestock healthcare facilities are provided in the livestock sector but remain inadequate in substantial numbers of field veterinarians, supporting staff, and health centers (NAVS, 2014). This healthcare system mostly focuses on artificial insemination of cattle, vaccination against infectious diseases, their control, and investigation programs (Ahuja et al., 2008). So, in most cases, state government-supported livestock healthcare facilities meagerly fulfill the needs of livestock owners in this region. For alleviating common health issues, folk therapies for treating animals have become obligatory and are actively practiced to date. However, ethnoveterinary medicines (EVM) have limitations in rapidly controlling epidemic infectious diseases and acute life-threatening bacterial infections. Like other folk therapeutic systems, traditional veterinary medicinal knowledge is also persisting as a non-codified system transmitted orally from generation to generation in the laterite region of West Bengal. However, the modernization of the traditional societies with rapid socio-economic, environmental, and technological changes can inevitably cause erosion of this knowledge. This ancient therapeutic knowledge remains mostly unexplored, which needs a thorough scientific study before being lost forever.

In order to add more objectivity to the ethnobiological research, the application of statistical indices for quantifying ethnobotanical data is gradually increased among ethnobotanists worldwide (Andrade-Cetto and Heinrich, 2011; Medeiros et al., 2011). Scientists now prefer ethnobotanical information measured by suitable statistical indices for bioprospecting of natural products as the ethno-guided information or leads provide more success rate than the taxonomy-guided and randomly selected leads (Rahaman, 2017). There are a few research articles on ethnoveterinary medicine published from India, where data have been analyzed using some popular statistical indices such as factor for informants’ consensus (Fic), use value (UV), relative frequency of citation (RFC), and fidelity level (FL) (Kumar et al., 2012; Kumar and Bharati, 2013; Yabesh et al., 2014;
The formulas of FL, UV, and RFC are mainly based on its use reports and are simple percentage calculations. Nevertheless, how far are these indices relevant to effectively quantify the usefulness of a plant for a specific purpose? Rather they can be considered “statistically insufficient” to assess the true reflection of the cultural importance of a species (Leonti, 2022). In order to evaluate the actual degree of cultural acceptance of a species and its importance as a whole, a much-dedicated quantitative index based on cultural consensus should be included.

In this context, the present work has been opted for the following goals:

- To document the existing vast ethnoveterinary medicinal knowledge from the northern laterite zone in West Bengal,
- To explore the perception and depth of the knowledge among the local people of this area,
- To quantify the ethnobotanical data using suitable statistical indices.

2 MATERIALS AND METHODS

2.1 Study Area

The state of West Bengal is characterized by its cultural, ethnic, and biological diversities and topographical uniqueness. It is the extended part of the eastern fringes of the Chota Nagpur plateau, which includes the western and central parts of Bankura district; western parts of Medinipur and Burdwan districts; and western, south-central, and northern parts of Birbhum district (Das, 2014). Laterite region is spanning across the latitude 22°00’ to 24°30’ N and longitude 86°45’ to 87°50’ E, and the altitude varies between 115 and 45 m. It covers an area of approximately 7,700 km², representing 22.3% of the total geographical area of the state (Hunday and Banerjee, 1967). Soil type is red and lateritic. The climate is "dry sub-humid mega thermal." The dry deciduous forests in this region represent nearly 15.2% of the total state geographical area. According to the Census of 2011, the percentage of Scheduled Tribes in this zone is 11.85%, and Scheduled cast is 26% (Census of India, 2011).

The study area of the present work is restricted to the northern part of the laterite zone of West Bengal, which includes mainly the western part of Burdwan district and western, south-central, and northern parts of Birbhum district. This part of the laterite region covers an area of approximately 2,290 km², which represents 29.74% of the total laterite cover of West Bengal. Altogether, 21 blocks have been selected for the present study, 11 from Burdwan district and 10 from Birbhum district, which fall within the northern laterite region of West Bengal (Figure 1).
Block is one of many small divisions of a district representing a compact area consisting of several villages.

2.2 Data Collection

Systematic field surveys were conducted in 21 blocks of the Birbhum and Burdwan districts in different seasons of a year from 2011 to 2018. A total of 132 participants were interviewed with the help of a semi-structured questionnaire, free listing, and focus group discussion after clearly presenting the purpose of the study and its outcome before the participants as per the stipulations of Nagoya Protocol 2014. Prior informed consent (PIC) was taken from each informant verbally before collecting the data on herbal knowledge. For the collection of data, during the field survey here, an attempt has been made to follow the best field practice as critically described earlier (Heinrich and Verpoorte, 2014; Heinrich et al., 2018; Weckerle et al., 2018), as per the code of ethics mentioned by the International Society of Ethnobiology (2006). Various visual stimuli were employed for plant identification and related data collection from the aged, and individuals with restricted movement, and female participants. For this, the fresh and/or dried plants and their parts, herbarium specimens, and photographs of the plants were exhibited to the participants to identify those plants and collection of associated ethnobotanical information (Figure 2). The authenticity of the information has always been confirmed by cross-checking other participants of the same and the other localities with the same set of questions and visual clues (Martin, 1995; Vogl et al., 2004; Thomas et al., 2007).

Information on the local name of the plants, their parts use, collection, preservation, mode of preparation of remedy, its administration, and dosages were recorded in detail. The geographic location of the participants’ permanent residence was noted in the form of global positioning system (GPS) coordinates. Their photographs and socio-demographic information were also recorded.

2.3 Collection of Plant Specimen and Preparation of Herbarium

Plants having ethnoveterinary medicinal uses were collected following the guideline set by the National Medicinal Plants Board, India (NMPB, 2015). Herbarium specimens have been prepared with the collected plant samples having specific field numbers following the techniques suggested by Jain and Rao (1977). For future reference, all the herbarium specimens have been kept in the departmental Herbarium (Visva-Bharati Herbarium, Department of Botany, Visva-Bharati, Santiniketan, India).

2.4 Identification of the Plant Specimen

The collected angiosperms were identified with the help of different Floras of West Bengal and its adjoining states (Guha Bakshi, 1984; Sanyal, 1994.; Saxena and Brahmam, 1994-1996; BSI, 1997; Paul et al., 2015; Ranjan et al., 2016). The following literature has been consulted to identify the collected species of fungi (Purkayastha and Chandra, 1985; Singer, 1986; Bilgrami et al., 1991) and species of pteridophytes (Dixit, 1984; Fraser-
Jenkins, 2008). Besides, herbarium specimens housed at Central National Herbarium (CAL), BSI, Howrah, India, have also been consulted.

Two specialists finally confirmed the identification of the collected plant species after critically examining the voucher specimens.

2.5 Nomenclature Update
The nomenclature of all the collected plant species has been updated following the standard websites such as World Flora Online1, The Plant List2, Tropicos3, and Germplasm Resources Information Network4.

2.6 Data Analysis
2.6.1 Qualitative Analysis of Ethnobotanical Data
Recorded information on the local name of the plant, updated scientific name, family, voucher specimen number, parts used, collection source, mode of preparation of the remedies, and administration with dosages were tabulated systematically.

2.6.2 Quantitative Analysis of Ethnobotanical Data
The following indices are included in this study.

2.6.2.1 Factor for Informants’ Consensus
One of the most widely used indices is the factor for informants’ consensus (Fic), proposed by Heinrich et al. (1998) based on the equation of Informant Agreement Ratio introduced by Trotter and Logan (1986).

For Fic analysis, it is necessary to classify health conditions/illnesses into broad disease categories. The formula of the Fic is

\[
\text{Fic} = \frac{\text{Nur} - \text{Nt}}{\text{Nur} - 1}
\]

where Nur refers to the number of use-reports for a particular use category/disease category and Nt refers to the number of taxa used for a particular use category/disease category by all participants.

2.6.2.2 Fidelity Level
In order to measure the reliability of the information provided by the participants, the fidelity level (FL) index is used. The value of FL is calculated following the formula:

\[
\text{FL}(\%) = \frac{\text{Np} \times 100}{\text{N}}
\]

Np is the number of respondents that claim the use of a plant species to treat a particular disease, and N is the number of respondents that use the plant as a medicine to treat any given disease (Friedman et al., 1986).

A high FL value (100%) is obtained for a plant when all the participants refer to it for the same purposes.

2.6.2.3 Cultural Value Index
The index is employed to understand the overall importance of a plant species in a particular culture (Reyes-García et al., 2006), and it is determined by the following formula:

\[
\text{CV} = \left[ \frac{\text{NU}^s / \text{NC}}{\text{FC}^s / \text{N}} \right] \times \left[ \sum_{u=1}^{\text{NC}} \sum_{i=1}^{\text{NI}} \frac{\text{UR}^i_u}{\text{N}} \right],
\]

where s indicates the ethno-species for determining cultural value. The value of the first factor of the index is obtained by dividing the total number of uses reported for the ethno-species s (NU) by the total number of use categories considered in the study (NC). The second factor of this index does mean the relative frequency of citation (RFC), and it is obtained by dividing the frequency of citation of that particular species (FGc) by the total number of participants interviewed (N). Here, the third factor indicates the cultural importance (CI) of the species s and is calculated based on the sum of all the use reports (UR) for that particular species. Finally, the CV value is obtained by multiplying the values of these three factors.

2.6.2.4 Preference Ranking Exercise
Preference ranking exercise is carried out among the selective key participants to find preferable species out of all the plant species cited by the participants for a specific purpose (Martin, 1995). It is based on a scoring system where points ranging from 0 to 10 are given by each of the selective key participants according to their preference. The highest scoring point (i.e., 10) is given to the most preferred species, but the lowest point is 0, which is assigned to the least preferred species. Based on the total score, all the species are then ranked.

2.6.2.5 Jaccard Index
The similarity of knowledge among the participants is assessed with the help of the Jaccard index (JI) using the following formula:

\[
\text{JI} = \frac{c \times 100}{(a + b) - c},
\]

where a and b are the number of plants known to the participants of areas A and B, respectively, and c is common to both A and B (Hamers, 1989).

2.6.2.6 Spearman Rank-Order Correlation
The Spearman rank-order correlation analysis is performed using R Studio 1.1.442 software to measure the strength and direction of correlation between the variables (Michelson and Schofield, 2002).

3 RESULTS
3.1 Socio-Demography of the Participants
Altogether 132 participants were interviewed, of which 109 persons are male (82.58%) and the remaining 23 participants are female (17.42%). Participants’ socio-demographic information is presented in Supplementary Table S1. All the participants belong to seven categories according to their social
designations (Figure 3). GPS coordinates of the participants’ residential location have been indicated in the study area map, which will help future researchers working in the related fields. Besides, it will strengthen the authenticity and intellectual property rights (IPR) of the knowledge providers.

It was observed in the present investigation that, among all the knowledge transmission pathways, “vertical transmission” of knowledge is predominant as in most of the cases (56.06%), the traditional wisdom is conveyed from the parents to their descendants.

With the increase in age, the knowledge domain of the knowledge holder is gradually widened. Here, the knowledge about ethnoveterinary medicinal plants has been compared between the participants belonging to four different age groups employing the percentage of EVM plant knowledge possessed by them (Figure 4). The results show that the participants aged 70 years and above have extensive knowledge as they reported the highest numbers of EVM plants along with their names and uses.

Altogether five barriers or constraints have been identified that hamper the knowledge transfer among the participants in the area. The most vital barrier is the modernization of the traditional society, which makes the younger generation less interested in their age-old folk therapeutic practices. The second barrier is the unavailability of forest resources. The third one is the cultural and linguistic differences between two persons of different communities. The fourth one is faith in modern medicine, whereas only one species represented the remaining 52 families.

3.2 Ethnoveterinary Medicinal Plants

3.2.1 Taxonomical Information

A total of 232 EVMPs have been recorded from the northern laterite part of West Bengal (Supplementary Table S2). All these EVMPs belong to 201 genera and 92 families. Among the recorded plant species, 194 species are of dicotyledonous plants, 33 species belong to monocotyledons, two species, namely, Adiantum philippense subsp. philippense and Lygodium flexuosum (L.) Sw. are of the pteridophyte group, and three species, namely, Amanita vaginata var. alba Gillet, Lycoperdon perlatum Pers., and Termitomyces heimii Natarajan belong to the group of fungi. Among the reported 92 plant families, Fabaceae is represented by the highest number of plant species (21 species). Two families, Malvaceae and Lamiaceae, are represented by ten species each; three families, Apocynaceae, Asteraceae, and Euphorbiaceae, are represented by nine plant species each, and eight species were recorded from the Solanaceae. Each of families Acanthaceae and Convulvulaceae was represented by seven species; family Rubiaceae was represented by six species; and four families (Amaranthaceae, Apiaceae, Moraceae, and Poaceae) were represented by five species each. Three families, Rhamnaceae, Vitaceae, and Zingiberaceae, were represented by four species each, and each of the six families (Araceae, Asparagaceae, Cucurbitaceae, Malvaceae, Menispermaceae, and Piperaceae) was represented by three species. The seventeen families (Anacardiaceae, Combretaceae, Myrtaceae, Phyllanthaceae, Rutaceae, Verbenaceae, etc.) were represented by two species each, whereas only one species represented the remaining 52 families.

3.2.2 Habits

Based on their habits, the recorded 232 plant species have been categorized into four groups, among which herbs dominated the list with 99 species (43%) followed by trees with 51 species (22%), shrubs with 43 species (19%), climbers with 36 species (15%), and fruit body with 3 fungal species (1%).

3.2.3 Collection Sources of the Ethnoveterinary Medicinal Plants

Among the 232 documented plant species, 199 species have been collected by the local people from wild sources, which indicates the richness of medicinal flora in the wild and confirms local
people's dependence on wild plant resources. Apart from it, 19 species are procured from commercial sources, and 14 species are grown in the cultivated field in the study area.

3.2.4 Plant Parts Used in Ethnoveterinary Medicine
For the preparation of ethnoveterinary medicine, plant parts are generally used in their fresh and dried form. Mainly used plant parts recorded here are underground parts (29.26%) such as root, rhizome, bulb, and tuber (Figure 5).

3.2.5 Use of Animal Parts, Earth, Minerals, and Other Substances
Different animal parts, organic and inorganic materials, have also been recorded from the study area. Those substances are used to prepare various remedies. Animal body parts and their products, such as bone, tooth, feather, scale, horn, body fats, honey, and fecal matter, are used along with the plant species in preparation for ethnoveterinary medicine. Earth or soil is used in many folk medicines as one of the ingredients. Soils collected from the mouth of crab hole and termite hill are used by the indigenous people here as an additional ingredient in the preparation of many folk veterinary remedies. Minerals have also been recorded here as important ingredients: rock salt, common salt, vermilion, potassium nitrate, iron sulfate, magnesium sulfate, naphthalene, and “Sankhachurna” (powder of Conch shell, a rich source of calcium carbonate). Some organic materials are used here in the form of mustard cake, molasses, jaggery, coconut oil, mustard oil, curd or whey, camphor, sunned rice (Aatop chal), particulate rice (Khud), and “Topchini/Chobchini” (an Ayurvedic product prepared from the dried roots of Chinese Smilax, Smilax china L.).

3.2.6 Forms of Remedies Prepared
Folk herbal remedies used for curing veterinary diseases are prepared and administered in various forms to treat several livestock diseases. Fourteen different forms of remedies have been recorded based on their preparation mode. The most predominant form of remedies prepared is paste (Figure 6). The preparation of paste is a widespread form of remedy preparation in different folk and traditional systems of medicine throughout the world.

3.2.7 Mode of Administration of a Remedy
Two distinct modes of remedy administration have been recorded. The most common route of remedy administration is oral (62%), and remedies are applied in the forms of paste, juice, powder, decoction, and so on. In 32% of cases, folk preparations were administered externally as a poultice, massage, eye drops, fresh intact part of a plant, and so forth. In very minimum cases (2%), the same remedy was administered internally and externally.
Magico-religious belief in the healing of diseases is a deep-rooted integral part of the ethnic cultures. Herein, parts of 11 plants and seven animal species are used in various ways in performing the 19 cases of magico-religious practices to treat 14 diseased conditions of the domesticated animals.

3.2.8 Livestock Diseases and Diagnostic Symptoms
Totally, 79 types of health disorders that prevailed among the veterinary animals were recorded. It has been noticed that animals in this region suffer mostly from the diseases such as gastrointestinal problems, dysentery, diarrhea, fever, and illness due to poisonous effects. Knowledgeable persons of the studied area, especially a "Go-Vaidya"—traditional healer of livestock diseases—can easily identify the diseased condition by observing the general appearance and behavior of the mute animals. A list of recorded health conditions of the livestock has been provided along with local names of the diseases and their visible or diagnostic symptoms in Supplementary Table S3.

3.2.9 Enumeration of Folk Veterinary Remedies
Altogether, 232 plant species have been recorded to prepare 306 folk remedies to treat 79 types of livestock diseases in the northern laterite region of West Bengal. Out of 306 recorded folk remedies, 184 remedies are of monoherbal types where only one herbal ingredient is used. The number of polyherbal remedies recorded is 110, and it is prepared using more than one herbal ingredient. The indigenous people administer the remaining 12 remedies out of their magico-religious belief in curing certain livestock diseases.

Among the 232 recorded plant species, ten species have frequently been used as one of the ingredients in a minimal amount, along with the principal ingredient in 110 different polyherbal preparations. Those 10 species are *Piper nigrum* L., *Curcuma longa* L., *Zingiber officinale* Roscoe, *Piper longum* L., *Nigella sativa* L., *Trachyspermum ammi* (L.) Sprague, *Cuminum cyminum* L., *Ferula assa-foetida* L., and *Allium sativum* L. All the recorded EVMs have been enumerated in a table providing the botanical names of the EVMPs, family, voucher specimen number, common names, their parts used, diseases or health conditions treated, mode of remedy preparation, route of administration, dosages, affected animal, and the number of citations (Table 1).

3.3 Quantitative Analysis of the Recorded Ethnoveterinary Medicinal Data
A total of 1,234 citations were made by the 132 participants. All the recorded 79 health issues are grouped into 20 disease
### TABLE 1 | Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (●, new EVMPs reported from India; ▲, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ◆, new in respect of the plant parts used).

| Sl. No. | Number of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|---------|-------------------------|--------------------------------------------|-------------|--------|------------|---------------------------------|-------------------------------------------|----------------|
| A       | Monoherbal formulations (n = 184) |                                   |             |        |            |                                 |                                      |                |
| 1       | Abelmoschus moschatus Medik. SKM12 | Musk okra | Malvaceae | Seed   | Poor health: powdered seeds (100 g) are given with rice bran once a day in the morning for 1 month 1) Loose motion: 3-4 seeds are given orally once a day for 2 days | 3 | Cow |
| 2       | Abrus precatorius L. SKM53 | Rosary pea | Fabaceae | Seed   | Root 2) Mastitis: freshly collected roots of the plant are made into a paste and mixed with the mud of crab hole; applied as a poultice on the affected nipple of mammary gland once a day for 7 days | 9 | Cow (>2 years) |
| 3       | Abutilon hirtum (Lam.) Sweet ◆ SKM34 | Indian mallow | Malvaceae | Leaf   | Suppurating wound: a handful of leaves are grounded to paste and applied as a poultice on the affected area twice a day for 3 days | 2 | Pig |
| 4       | Senegalia catechu (L.f.) P.J.H.Hurter and Mabb. SKM89 | Black Catechu | Fabaceae | Leaf   | Diarrhea: fresh leaves (2–2.5 kg) are fed separately or with fodder twice a day for 3 days 1) Opacity of cornea: juice is extracted from unripe fruits (250 g), mixed in 1 L of water, and given orally with a pinch of rock salt twice a day for consecutive 3 days | 7 | Cow and buffalo (>2 years) |
| 5       | Vachellia nilotica subsp. indica (Benth.) Kyal. and Boatw.SKM02 | Prickly acacia | Fabaceae | Fruits | Bark 2) Diarrhea: bark (600 g) extract is given twice a day for 3 days along with a pinch of rock salt 1) Liver trouble: one mature root (5 cm) is made into a paste with holy water and administered orally once a day for 3 days 2) Maggot infested wound: root of one mature plant is made into a paste and heated for some time, lukewarm paste applied topically twice a day for 7 days | 13 | Cow and buffalo (>2 years) |
| 6       | Achyranthes aspera L. SKM85 | Prickly chaff flower | Amaranthaceae | Root   | Root 2) Dyspepsia: dried rhizome powder is mixed with a fine dust of mustard cake. It is fed twice a day for 5–7 days 1) Body lice: juice is extracted from fresh rhizome and applied on the whole body once a day for consecutive 3 days | 5 | Cow |
| 7       | Acorus calamus L. SKM819 | Sweet flag | Acoraceae | Rhizome | Rhizome 2) Dyspepsia: dried rhizome powder is mixed with a fine dust of mustard cake. It is fed twice a day for 5–7 days 1) Body lice: juice is extracted from fresh rhizome and applied on the whole body once a day for consecutive 3 days | 2 | Calf |
| 8       | Aerva javanica (Burm. f.) Juss. ex Schult. ◆ SKM21 | Pillow-weed | Amaranthaceae | Leaf   | Fractured bone: fresh leaves are made into a paste as applied as a poultice on the fractured site; then, the fractured leg is tightly bound with bamboo cheeps and clothes 1) Inflammatory swelling of shoulder: the leaves are heated slightly and squeezed to extract | 3 | Goat, sheep, dog |
| 9       | Agave americana L. ♥ SKM23 | Century plant | Asparagaceae | Leaf   | 1) Inflammatory swelling of shoulder: the leaves are heated slightly and squeezed to extract | 5 | Bulock, buffalo |

(Continued on following page)
TABLE 1 | Continued Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (●, new EVMPs reported from India; ▲, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ●, new in respect of the plant parts used).

| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|------------------------|--------------------------------------------|-------------|--------|------------|-----------------------------------------------------------------|---------------------------------------|---------------|
|                         |                                            |             |        |            | out the juice and then administered on the affected area of the shoulder thrice a day for 2-3 days | 3                                      | Cow           |
|                         |                                            |             |        | Leaf       | 1) Liver trouble: juice is taken out from a handful of leaves and given orally once in the morning for consecutive 3 days | 2                                      | Donkey        |
|                         |                                            |             |        | Bark       | 2) Opacity of cornea: fresh bark juice is first filtered with the help of fine cloth and given as an eye drop twice a day till the cure | 2                                      | Donkey, pony  |
|                         |                                            |             |        | Root       | 2) Hemorrhagic septicemia (H9): root of one mature plant is made into paste and fed once a day for 3 days | 5                                      | Cow, bullock, buffalo |
|                         |                                            |             |        | Whole plant| 3) Retention of milk (Dudh-thunko): one plant is chopped into small pieces, cooked with particulate rice (Khud) and given once in the night for consecutive 3 days | 11                                     | Milch cow     |
|                         |                                            |             |        | Root       | 1) Snake bite: one piece of mature root (about 10 cm) is made into paste and given orally twice a day for 3 days | 2                                      | Cow, bullock, buffalo |
|                         |                                            |             |        | Aerial part| Foot and mouth disease (FM): dried aerial part made into a paste with honey and given once a day for 7 days | 2                                      | Cow           |
|                         |                                            |             |        | Leaf       | Cough: a handful of leaves are made into a paste and given orally with old molasses | 2                                      | Sheep, goat, cattle |
|                         |                                            |             |        |            | Body lice: leaf juice is applied topically all over the body once a day till the cure | 11                                     | Cow, bullock, buffalo |

(Continued on following page)
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (▲, new EVMPs reported from India; ◊, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ♦, new in respect of the plant parts used).

| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|--------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------------|---------------|
| 18     | Argemone mexicana L. SKM28                 | Mexican prickly poppy | Papaveraceae | Leaf | Tick: leaf juice is applied thoroughly all over the body once a day for 3 days to eradicate all the ticks from the body | 3 | Dog |
| 19     | Argyneira nervosa (Burm. f.) Bojer SKM832 | Elephant Climber | Convolvulaceae | Leaf | Miscarriage: freshly collected 9–11 mature leaves are fed daily, starting from 15 days before the expected time of parturition | 2 | Gravid cow |
| 20     | Asparagus racemosus Wild. SKM134           | Shatavari | Asparagaceae | Root | Poor lactation: freshly collected 3–5 pieces of root are made into a paste and given orally on an empty stomach | 6 | Milch cow |
| 21     | Alstonia scholaris (L.) R. Br. ♦ SKM918    | Devil’s tree | Apocynaceae | Leaf | Inflammatory swelling of shoulder: freshly collected seven leaves are made into a paste with common salt and applied as a poultice on the affected shoulder | 3 | Bullock, buffalo |
| 22     | Allium sativum L. SKM17                    | Garlic      | Amaryllidaceae | Bulb | Maggot infested wound (between hooves and in genital opening): nine cloves of garlic are crushed and boiled in coconut oil; this medicated oil then applied topically onto the infested area | 9 | Cow, bullock |
| 23     | Artocarpus heterophyllus Lam. SKM103       | Jackfruit   | Moraceae | Leaf | 1) Diarrhea: freshly collected 10–15 leaves are fed once daily till the cure | 11 | Cow |
|        |                                            |             |        |            | 2) Swelling of dewlap: leaves (about 1 kg) are made into a paste with common salt and applied as poultice throughout the dewlap once in the morning till the cure | | |
| 24     | Cajanus goensis Datell. ♦ SKM924           |             | Fabaceae | Root | Fever: root (about 5 g) is made into a paste and fed with saline water thrice a day for 3 days | 2 | Sheep |
| 25     | Azadirachta indica A. Juss. SKM32          | Neem        | Meliaceae | Seed oil | 1) Body lice: leaf juice applied on the whole body twice a week | 3 | Cow |
|        |                                            |             |        |            | 2) Foot and mouth disease (FM): seed oil applied twice a day onto the affected area till the cure | | |
| 26     | Bambusa bambos (L.) Voss. SKM09            | Indian thorny bamboo | Poaceae | Leaf | Loose motion: fresh leaves (2–2.5 kg) are fed exclusively or along with the cattle feed twice a day for 2–3 days | 9 | Buffalo, cow |
| 27     | Barleria prionitis L. SKM418               | Dog bush    | Acanthaceae | Leaf | Wound due to castration: a handful of leaves are crushed into a paste and mixed with mustard oil, applied as a poultice on the wound to stop bleeding and quick healing | 5 | All types of ruminants |
| 28     | Bauhinia acuminata L. SKM739               | White Bauhinia | Fabaceae | Bark | Inflammatory swelling of shoulder: lukewarm bark paste applied as a poultice on the affected area twice a day till the cure | 2 | Bullock, buffalo |
| 29     | Bombax ceiba L. SKM44                      | Silk cotton tree | Malvaceae | Bark | | 2 | Buffalo |

(Continued on following page)
| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|-------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------------|----------------|
| 1      | Kalanchoe pinnata (Lam.) Pers. SKM55       | Leaf of life | Crassulaceae | Leaf       | Retention of urine: leaf paste applied as a poultice on the lower abdomen once a day in the evening for 3 days | 2                                      | Goat, sheep   |
| 2      | Blumea lacera (Burm.f.) DC. SKM141         | Blumea      | Asteraceae | Leaf       | Retention of the placenta: juice obtained from mature leaves (11 pieces) are given orally twice a day for 3 days | 3                                      | Cow           |
| 3      | Cajanus scarabaeoides (L.) Thouars SKM584  | Showy pigeonpea | Fabaceae | Whole plant | Diarrhea: freshly collected whole plant is chopped finely and fed once in the morning for 5–7 days | 7                                      | Goat          |
| 4      | Caladium bicolor (Aiton) Vent. SKM94       | Heart of Jesus | Araceae | Corm       | Swelling wart: corn made into paste and applied as poultice on the affected area twice a day till the cure | 2                                      | Goat          |
| 5      | Carica papaya L. SKM19                     | Papaya      | Caricaceae | Leaf       | Loose motion: fresh leaves (1–1.5 kg) are fed exclusively once a day for 2–3 days | 11                                     | Calf          |
| 6      | Causonis trifolia (L.) Mabb. and J.Wen SKM95 | Three-Leaved Wild Vine | Vitaceae | Whole plant | Swelling of the body due to poisoning (Sapurey): the required amount of the whole plant is made into a paste with holy water and applied topically on the whole body only once Rhinorrhoeas: freshly prepared juice is slightly heated, and lukewarm juice (two tablespoons) is applied as the nasal drop in each of the nasal openings once in the evening daily till the cure | 11                                     | Cow, bullock, buffalo |
| 7      | Centipeda minima (L.) A.Braun and Asch. SKM286 | Spreading Sneezie Weed | Asteraceae | Whole plant | Rheumatoid arthritis: rhizome (10–15 g) is made into a paste and fed with molasses once a day for 15 days | 5                                      | Goat, sheep   |
| 8      | Hellenia speciosa (J.Koenig) S.R.Dutta SKM547 | Crepe Ginger | Costaceae | Rhizome | Rheumatoid arthritis: 14–15 pieces of mature leaves are made into a paste and mixed with 5 g powder of Ammonium chloride (Nishadal), fecal matter of a heifer (500 g), and the required amount of soil around the mouth of crab hole. All the ingredients are taken into an earthen pot, heated for a few minutes, and applied all over the paralyzed leg twice a day till the cure | 7                                      | Cow           |

(Continued on following page)
| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|---------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|-------------------------------------|---------------|
| 39     | Chenopodium album L. SKM477 -h-bi-Bl¡ Goosefoot | Amaranthaceae | Whole plant | Poor lactation: whole plant (about 500 g) is given once in the morning for 1 month | 8 | Milch cow |
| 40     | Cissus quadrangularis L. SKM37 Devil's backbone | Vitaceae | Stem | Fractured bone: stem paste used as a poultice on the affected area and tightly wrapped with clothes remains as it is for at least 1 month | 19 | All types of small ruminant |
| 41     | Cuscuta reflexa Roxb. ♥ SKM919 Giant dodder | Convolvulaceae | Whole plant | Food poisoning: about 250 g of plant paste is mixed well in 2 L of water and fed immediately | 3 | Cow, bullock, buffalo |
| 42     | Guilandina bonduc L. SKM174 Grey nicker | Fabaceae | Seed | High fever: powder of 50–150 g of seeds (according to body weight) is given orally once in the morning for 3 days | 3 | Cow, bullock |
| 43     | Capparis zeylanica L. SKM99 Ceylon Caper | Capparaceae | Stem bark | Bloat: decoction is prepared from 50 g of stem bark and given orally twice a day for 7 days | 2 | Buffalo (<2 years) |
| 44     | Capparis sepiaria L. SKM215 Hedge caper | Capparaceae | Root | Muscle pain: root extract is given orally once a day for 3 days | 2 | Bullock |
| 45     | Cardiospermum halicacabum L. SKM456 Balloon V | Sapindaceae | Root | Dysentery of a small ruminant: little amount of root is made into a paste and mixed with 500 ml of water, administered orally once a day for 3 days | 5 | Young goat and sheep (2-3 months of age) |
| 46     | Careya arborea Roxb. ♥ SKM56 Wild guava | Lecythidaceae | Leaf | 1) Opacity of cornea: 2-3 drops of leaf juice are applied on the affected eye thrice a day till the cure | 2 | Bullock |
|         |     |             | Bark | 2) Dysentery: decoction made from dried bark is given orally twice a day till the cure | 2 | Cow |
|         |     |             | Ripe fruit | 3) Constipation: fruit pulp is given orally once a day for 3 days | 2 | Cow |
| 47     | Carissa spinarum L. SKM873 Bush plum | Apocynaceae | Root | Maggot infested wound: paste prepared from 100 g of dried root is applied as a poultice on the affected area twice a day for 7 days | 2 | Cow |
| 48     | Casearia tomentosa Roxb. ♥ SKM693 Toothed Leaf Chilla | Salicaceae | Bark | 1) Diarrhea: bark extract is given orally twice a day for 3 days | 3 | Sheep, goat |
|         |     |             | Bark or ripen leaf | 2) Wound due to castration: bark extract or leaf juice is applied thrice a day till the cure | 2 | Goat |
| 49     | Baccharoides anthelmintica (L.) Moench SKM38 Ironweed | Asteraceae | Seed | Fever: seed powder is given with molasses after mixing in lukewarm water once a day for consecutive three mornings | 3 | Bull |
| 50     | Cissampelos pareira L. SKM54 Velvet Leaf | Menispermaceae | Root | Dog or snake bite: root (3–5 cm) extract is given orally as soon as possible | 7 | Cow |
| 51     | Cocculus hirsutus (L.) W.Theob. SKM458 Broom creeper | Menispermaceae | Leaf | Body lice: leaf juice is applied on the whole body twice a week | 2 | Goat |
| 52     | Coix lacryma-jobi L. SKM163 Job’s tears | Poaceae | Root | Diarrhea: root decoction is given orally twice a day for 3 days | 2 | Cow |
| 53     | Coriandrum sativum L. SKM78 Coriander | Apiaceae | Seed | 1) Haematuria: an infusion made from seed dust is given in the | 5 | Cow |

(Continued on following page)
### TABLE 1

| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|-------------------------|---------------------------------------------|-------------|--------|------------|---------------------------------------------------------------------------------|----------------------------------------|----------------|
| 54                      | *Crinum asiaticum* L. SKM179                | Seashore Lily | *Amaryllidaceae* | Whole plant | early morning once a day for consecutive 10–15 days 2) Mastitis: whole plant made into a paste with holly water and applied on the stiff and painful tits twice a day till the cure area twice a day for consecutive 7 days | 2 | Milch cow and buffalo |
| 55                      | *Croton persimilis* Müll. Arg. *Croton Tree* SKM189 | | *Euphorbiaceae* | Bulb | Swelling warts: poultice of tuber paste is applied on the swollen area twice a day for consecutive 7 days | 5 | Buffalo |
| 56                      | *Coccinia grandis* (L.) Voigt *Ivy gourd* SKM191 | | *Cucurbitaceae* | Root | Poor lactation: paste prepared from mature root (10 cm) is given orally once in the evening for 15–20 days | 2 | Milch cow |
| 57                      | *Curculigo orchioides* Gaertn. *Golden eye-grass* SKM62 | | *Hypoxidaceae* | Root | 1) Whitening and watering of eyes: 2-3 drops of leaf juice is applied on the affected eye once a day for 7–10 days 2) Poor health: finely chopped plant parts are fed once a day for 7 days | 3 | Bullock, bullock |
| 58                      | *Curcuma longa* L. SKM20 *Turmeric* | | *Zingiberaceae* | Fruiting shoot | Loosening of teeth (*Kalasashru*): freshly collected rhizome is made into a paste and mixed with scale-ash of the Chital fish (*Chitala chitala*) and rock salt in 2:1:2 ratio; the entire mixture is then stirred well in mustard oil and applied at the base of the loosened teeth, wrapped with a piece of cotton and then a red hot iron rod is put on it. This practice is done once a day for successive 3 days | 2 | Bullock, buffalo |
| 59                      | *Volkameria inermis* L. SKM564 | The glory bower | *Lamiaceae* | Leaf | Body lice: leaf juice is applied all over the body on alternative days for a week | 3 | Cow, bullock, goat |
| 60                      | *Clerodendrum infortunatum* L. SKM06 | Hill glory bower | *Lamiaceae* | Leaf | Body lice: leaf juice is administered throughout the body once a day for 2-3 days followed by a thorough bath | 7 | Cow, bullock, goat |
| 61                      | *Cleome gynandra* L. SKM991 | Cat’s whiskers | *Cleomaceae* | Whole plant | Rheumatoid arthritis (*Shimola-rog*): the whole plant is made into a paste with common salt and fecal matter of black goat, applied topically on the affected area once a day for 9–10 days | 2 | Bullock |
| 62                      | *Colocasia esculenta* (L.) Schott SKM76 | Taro | *Araceae* | Corm | Tumor: freshly collected corm is made into a paste along with common salt and applied as poultice once a day for 5–7 days | 3 | Sheep |

(Continued on following page)
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (◆, new EVMPs reported from India; ◆, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ●, new in respect of the plant parts used).

| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|---------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------------|---------------|
| 63     | Cotula anthemoides L. SKM266 (◆)            | Buttonweed  | Asteraceae | Whole plant | Watering of eyes: infusion is used to wash the infected eyes               | 2                                      | Cow           |
| 64     | Crotalaria quinquefolia L. SKM353           | Five Leaf Rattlepod | Fabaceae | Whole plant | A sudden decrease in milk production: the whole plant is used as cattle feed once a day for 15 days | 3                                      | Milch cow     |
| 65     | Cyanotis tuberosa (Roxb.) Schult. and Schult.f. SKM111 | Sahyadri Dew-Grass | Commelinaceae | Root | Fever: root paste is given orally along with rice bran once a day for consecutive 3-5 days | 4                                      | Heifer        |
| 66     | Datura stramonium L. SKM114 | Thorn apple | Solanaceae | Leaf and fruit | Food poisoning: leaves (8–10 pieces) or fruits (1 or 2) are made into a paste and administered orally once a day for at least 3 days | 4                                      | Cow           |
| 67     | Dendrophthoe falcata (L.f.) Ettingsh. SKM92 | Long-leaved Mistletoe | Loranthaceae | Leaf | Prolapsed uterus (Bhnaral berono): leaf extract is used as a surface disinfectant to immediately wash the oozed out uterus and then replacement in its original position is done | 4                                      | Cow           |
| 68     | Dendrolobium triangulare (Retz.) Schindl. SKM678 | Triangular Horse Bush | Fabaceae | Leaf | Whitening of eyes: one tablespoon of leaf juice is applied dropwise on the affected eye | 2                                      | Calf          |
| 69     | Dioscorea bulbifera L. SKM268 | Air yam | Dioscoreaceae | Tuber | Mastitis: 250–100 gm tuber is sliced and given with cattle feed once a day for 7 days | 3                                      | Milch cow     |
| 70     | Dillenia pentagyna Roxb. SKM265 | Dog Teak | Dilleniaceae | Bark | Helminthiasis: bark powder is given orally once a day at nighttime for 7 days | 2                                      | Sheep         |
| 71     | Wattakaka volubilis (L.f.) Stapf. SKM182 | Green Milkweed Climber | Apocynaceae | Leaf | 1) Swelling of throat: 21 leaves are made into a paste along with common salt and applied as a poultice on the affected area for consecutive 3 days | 3                                      | Bullock       |
|         |                                            | Stern | Apocynaceae | Leaf | 2) Discontinuity in urination/ urinary incontinence: freshly collected stems are boiled with particulate rice (Khud) and given orally once a day till the cure | 9                                      | Cow           |
| 72     | Echinops echinatus Roxb. SKM421 (◆)         | Indian globe thistle | Asteraceae | Tender shoot | 1) Infertility: freshly collected 2–3 tender twigs are made into a paste and fed along with paddy straw after the onset of the normal heat period | 2                                      | Cow           |
|         |                                            | Whole plant | Asteraceae | Tender shoot | 2) Sore on shoulder: 250 g of freshly collected plants is made into a paste and applied as a poultice on the affected shoulder twice a day till the cure | 2                                      | Bullock, buffalo |
| 73     | Enydra fluctuans DC. SKM422 | Buffalo Spinach | Asteraceae | Whole plant | Constipation: freshly collected plants (1.5–2 kg) are fed twice a day to get relief from constipation | 7                                      | Goat          |
| 74     | Euphorbia antiquorum L. SKM302 (◆)          | Triangular Spurge | Euphorbiaceae | Latex | Opacity of cornea: two drops of fresh latex is given as eye drop on the affected eye once a day for 3 consecutive mornings | 3                                      | Bullock       |

(Continued on following page)
| Sl. No. | Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|--------------|---------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------------|----------------|
| 75     | *Euphorbia fusiformis* Buch.-Ham. ex D. Don ♥ SKM93 | Pillpod spurge | Euphorbiaceae | Tuberous root | Poor lactation: fresh tuber (100–150 g) is sliced and given with rice gruel or 50 g tuber powder is fed along with rice bran once in the evening for at least 15 days | 4 | Milch cow |
| 76     | *Euphorbia hirta* L. SKM147 | Hairy Spurge | Euphorbiaceae | Latex | Mastitis: freshly collected latex is applied topically thrice a day till the cure | 2 | Milch cow |
| 77     | *Euphorbia neriifolia* L. SKM229 | Indian Spurge Tree | Euphorbiaceae | Latex and stem bark | 1) Broken horn: latex is applied on the base of the broken horn, and a poultice is made with bark, which is applied uniformly over it and then tied with cloth and left as it is for 21 days 2) Mastitis: leaves are made into a paste along with sunned rice (Atop-chal) and applied as a poultice on the affected tits | 3 | Milch cow |
| 78     | *Ficus benghalensis* L. SKM06 | Indian banyan | Moraceae | Prop root | Dysentery: the soft, red, apical parts of prop roots (12–15 cm long) are given exclusively or along with the cattle feed, twice a day for 2-3 days. Dose: cow and buffalo—6 to 7 pieces, goat and sheep—2 to 3 pieces | 9 | Cow, buffalo, goat, sheep |
| 79     | *Ficus religiosa* L. SKM82 | Sacred Fig Tree | Moraceae | Leaf | Foot and mouth disease (FM) (Pankui): 5 or 6 fresh leaves are made sacred by some religious ritual (i.e., name of the lord “Arjuna” is written 12 times on each leaf) and fed twice a day for 3 days | 3 | Cow |
| 80     | *Ficus racemosa* L. SKM109 | Cluster fig | Moraceae | Fruit | Constipation: sliced mature fruit is given orally | 3 | Bullock |
| 81     | *Gardenia latifolia* Aiton SKM1113 | Indian Boxwood | Rubiaceae | Bark | Wound: bark decoction applied on the wound twice a day till cured | 2 | Sheep, goat, cow |
| 82     | *Gloriosa superba* L. SKM908 | Flame lily | Colchicaceae | Tuber | 1) Prolapsed uterus: extract of the tuber is applied externally to wash the oozed out uterus 2) Abscess in liver: tuber paste is given with molasses once a day for at least 1 month | 7 | Cow |
| 83     | *Adina cordifolia* (Roxb.) Brandis SKM912 | Heart-leaf adina | Rubiaceae | Tender leaf | Opacity of cornea: leaf juice is applied as eye drop once in the morning till cured | 2 | Sheep |
| 84     | *Helicteres isora* L. SKM817 | Indian screw tree | Malvaceae | Fruit | 1) Bloody dysentery: dried fruits (3–5 pieces) are made into a paste with a pinch of black salt and given twice a day for 3 days 2) Poisonous bite: leaf paste is used as a poultice on the biting site | 7 | Goat |
| 85     | *Strobilanthes hirta* (Vahl) Blume SKM791 | Red Ivy | Acanthaceae | Whole plant | Haematuria: freshly collected plants (250 g) are made into a paste, mixed in 1 L of water, and fed the entire preparation with the help of a bottle | 7 | Cow |
| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|-------------------------------------------|-------------|--------|------------|-----------------------------------------------------------------------------|----------------------------------------|--------------|
| 86     | Hibiscus cannabinus L. SKM1133 | Deccan hemp | Malvaceae | Leaf | Constipation: 250–300 g of fresh leaves are given orally once a day for 3 days | 2 | Bullock |
| 87     | Hydrolea zeylanica (L.) Vahl SKM549 | Ceylon Hydrolea | Hydrooleaceae | Whole plant | Wound: a bunch of whole plant is made into a paste and applied topically once daily till cured | 3 | Bullock |
| 88     | Mesosphaerum suaveolens (L.) Kuntze SKM128 | Mint Bush | Lamiaceae | Leaf | Fresh cuts and wounds: leaf juice is applied as a hemostatic agent | 4 | Bullock, buffalo |
| 89     | Ipomoea caurica (L.) Sweet SKM239 | Messina Creeper | Convolvulaceae | Tuber | Helminthosis (with stomachache): tuber (100–150 g) made into a paste with holy water and given with fodder once a day for 3 days | 2 | Cow |
| 90     | Ipomoea cairica Jacq. SKM549 | Messina Creeper | Convolvulaceae | Tuber | Poor lactation: small pieces are boiled with particulate rice and given at night once a day for 5–7 days | 5 | Milch cow |
| 91     | Ipomoea obscura (Linn.) Ker.-Gawl. SKM547 | Obscure Morning Glory | Convolvulaceae | Leaf | Broken horn: leaf paste is mixed with coconut oil and heated slightly. This lukewarm paste is then applied as a poultice at the base of the broken area and tightly wrapped with a cloth | 2 | Goat |
| 92     | Jatropha rana Daizell and A.Gibson SKM151 | Dwarf Jatropha | Euphorbiaceae | Tuberous root | Retention of milk: dried root powder is given orally once a day for 10–15 days (sometimes fed with finely pounded mustard cake) | 3 | Milch cow |
| 93     | Justicia adhatoda L. SKM184 | Malabar nut | Acanthaceae | Leaf | Body swelling due to cold (Jol-sannipat): leaf paste is heated slightly and applied on the whole body surface twice a day for 3 days | 3 | Cow |
| 94     | Justicia gendarussa Burm.f. SKM339 | Willow-leaved Justicia | Acanthaceae | Root | Helminthiosis: root (5–7 g) paste is given with lukewarm water once at night for 7 days | 3 | Cow |
| 95     | Jatropha gossypilfolia L. SKM192 | Bellyache bush | Euphorbiaceae | Seed | Constipation: seed paste is given orally to treat constipation | 2 | Goat |
| 96     | Lawsonia inermis L. SKM657 | Henna bush | Lythraceae | Leaf | Foot and mouth disease (FM): leaf paste is applied topically on the affected area twice a day till the cure | 5 | Cow |
| 97     | Leonotis nepetifolia (L.) R.Br. SKM638 | Christmas candestick | Lamiaceae | Root | Mastitis: root paste is applied as a poultice on the whole udder and tits twice a day for 3 days | 2 | Milch cow |
| 98     | Lippia javanica (Burm.f.) Spreng. SKM676 | Lemon bush | Verbenaceae | Whole plant | Tick: freshly collected plant is made into a paste and applied topically all over the body once a day for 3 days | 2 | Cow |
| 99     | Linum usitatissimum L. | jo-e Linseed | Linaceae | Seed oil | Constipation: oil is extracted from 750 g to 1 kg of seeds and given half of it at a time orally twice a day for 3 days | 7 | Bullock, buffalo |
| 100    | Litsea glutinosa (Lour.) C. B. Rob. SKM722 | Bolly beech | Lauraceae | Bark | 1) Loose motion: 1 L of water emulsion is prepared from 200 g of freshly made bark paste and given twice a day for 3 days | 4 | Cow, buffalo |

(Continued on following page)
| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|--------------------------------------------|-------------|--------|------------|---------------------------------------------------------------------------------|----------------------------------------|----------------|
| 101    | Ludwigia adscendens (L.) H.Hara ♦ SKMS34   | Water Primrose | Onagraceae | Bark       | 2) Dislocation of joints: bark is made into a paste and heated slightly. After application of this lukewarm paste on the affected area, a tight bandage of bamboo stick is provided | 6                                      | Cow            |
|        |                                            |             |         |            | Infertility: freshly collected plants (size must be 1/3 the body length of the cattle treated) are chopped into small pieces and fed along with paddy straw once a day for a month, starting from the onset of the normal heat period |                                        | Heifer         |
| 102    | Luffa acutangula (L.) Roxb.                | Ridged Gourd | Cucurbitaceae | Dried fruit fiber | Cold, cough, and watering of the nose: affected animals are separately kept in a room of cowshed; dried fruit fibers are kept inside it and fired to produce smoke as a remedy | 11                                     | Bulock         |
| 103    | Luffa aegyptiaca Mill. SKM161             | Sponge gourd | Cucurbitaceae | Dried fruit fiber | Cold, cough, and watering of the nose: smoke is produced by burning the dried fruit fibers in a separate room of a cowshed, and affected animals are kept there for some time for quick healing | 7                                      | Bulock         |
| 104    | Lycoperdon perlatum Pers. SKM91           | Puffball    | Agaricaceae | Spore      | Ulcerated wound: spore dust is applied topically on the affected part once a day for 5 days | 5                                      | Sheep          |
| 105    | Manilkara hexandra (Roxb.) Dubard SKM341  | Ceylon wood | Sapotaceae | Stem bark  | Tonsilitis: bark is made into a paste along with the mud of crab hole and warmed slightly; poultice: twice a day till the cure (applied on the outer side of lower jaws) | 2                                      | Bulock         |
| 106    | Martynia annua L. SKM441                  | Tiger’s claw | Martyniaceae | Leaf       | Wound: leaf decoction is applied topically to disinfect the wound | 2                                      | Goat           |
| 107    | Mimosa pudica L. SKM841                   | Touch-me-not | Fabaceae   | Root       | Maggot infested wound: root paste is applied topically twice a day for 5 days | 7                                      | Cow            |
| 108    | Mitragyna parvifolia (Roxb.) Korth. SKM761| Kaim        | Rubiaceae  | Bark       | Septic wound: bark juice applied topically to wash the wound | 2                                      | Sheep, goat, pig |
| 109    | Moringa oleifera Lam. SKM846              | Drumstick tree | Moringaceae | Root       | Food poisoning: juice is made from 250 g of root and mixed well in 2 L of water and given immediately | 5                                      | Cow            |
| 110    | Musa paradisiaca L. ♦ SKM31               | Banana      | Musaceae   | Corm       | 1) Haematuria: the corn of a post-fructifying plant is collected and sliced into several small pieces and then kept in cold water overnight. The pieces along with that water is administered twice a day for 2-3 days (for immature — once a day), 2) Loose motion: 1 or 2 leaves are fed solely twice a day for 2-3 days | 4                                      | Cow            |

(Continued on following page)
### TABLE 1

| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|---------|---------------------------------------------|-------------|--------|------------|-----------------------------------------------------------------------------|----------------------------------------|----------------|
| 111     | Nerium oleander L. SKM67 Oler | Oleander rose-bay | Apocynaceae | Leaf | Mastitis: leaf paste is used as a poultice on the affected tits twice a day till cured | 2 | Milch cow |
| 112     | Nicotiana rustica L. ▲& Aztec tobacco | Leaf | Solanaceae | Leaf | Maggot infested wound: 10 g of leaf powder of tobacco and 100 g powder of “Sankhachurna” are mixed with mustard oil and administered on the wound many times a day for a few days | 3 | Bullock, buffalo |
| 113     | Nigella sativa L | Black cumin | Ranunculaceae | Seed | Mastitis: seeds are boiled with particulate rice (“Khud” grain and fed daily once in a day | 7 | Milch cow |
| 114     | Nymphaea nouchali Burm.f. SKM752 Red Water Lily | Rhizome | Nymphaeaceae | | Stop mastication: rhizome paste is given orally | 2 | Bullock |
| 115     | Oroxyllum indicum (L.) Kurz SKM619 Indian trumpet tree | Flower | Bignoniaceae | | Mastitis: flower paste is applied as a poultice on cracked nipples twice a day for 7 days | 2 | Milch cow and buffalo |
| 116     | Papaver somniferum L. Opium poppy | Fruit coat | Papaveraceae | | Bloody dysentery: fruit coat (200 g) is soaked in 2 L of water overnight and then boiled and condensed to 500 ml. The boiled fruit coats are squashed and strained. Whole soup is then administered of a dose of 25–30 ml, 3-4 times a day for a few days | 5 | Cow |
| 117     | Phoenix acaulis Roxb. Dwarf date palm SKM205 | Arecaceae | Tender Leaf | | 1) Retention of milk (post-parturition): freshly collected tender leaves are chopped finely and fed once a day for 10–15 days Soft root 2) Dystocia (difficulty in parturition): soft roots (50 g) are made into a paste and fed along with rice gruel once a day for 10 days till the expected date of parturition to avoid any difficulty in it | 4 | Cow |
| 118     | Phylia nodiflora (L.) Greene SKM362 | Frog fruit | Verbenaceae | Whole plant | Dyspepsia of calf: freshly collected plants are chopped finely and given orally once a day for 15–20 days | 2 | Heifer |
| 119     | Polygala arvensis Willd. Field Mlikwort SKM108 | Polygalaaceae | Whole plant | | Nervine disease/listeriosis (Gaighuro): a bunch of whole plants is chopped finely and given with paddy straw once in the morning for 9 days | 2 | Cow |
| 120     | Portulaca oleracea L. Common purslane SKM720 | Portulacaceae | Whole plant | | Mastitis: plant paste is given orally once a day for 7 days | 2 | Goat |
| 121     | Pueraria tuberosa (Willd.) DC. Indian kudzu SKM188 | Tuber | Fabaceae | | 1) Hemimhinosis: sliced pieces of tuber are fed along with paddy straw or with rice gruel once in the morning for three consecutive days Tuber 2) Poor lactation: sliced pieces of tuber (fresh or dried form) are given orally once a day for 15 days | 3 | Cow |

(Continued on following page)
| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|------------------------|--------------------------------------------|------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------|---------------|
| 122                    | Psidium guajava L. SKM370                   | Guava      | Myrtaceae | Tuber      | 3) General weakness: sliced pieces are soaked overnight in rice gruel and fed the whole thing in the next morning | 7 | Milch cow and buffalo |
| 123                    | Rivea hypocrateriformis Choisy SKM77       | Common Night Glory | Convolvulaceae | Bark | Cuts and wounds: bark decoction is applied on the affected area as a disinfectant | 3 | Cow, bullock, buffalo, goat, sheep |
| 124                    | Santalum album L. SKM311                   | Sandalwood | Santalaceae | Bark | Fractured bone: plant paste is applied as a poultice on the affected area and wrapped tightly with bamboo sticks and left as it is for 1 month Fever: paste of bark (100–150 g) is given orally once a day for 2 days | 4 | Bullock, cow |
| 125                    | Scoparia dulcis L. SkM10                   | Sweet-broom | Plantaginaceae | Whole plant | Retention of urine: water emulsion is prepared in 1 L of water with 100 g of plant paste and drench once a day for 7 days | 3 | Sheep, goat |
| 126                    | Schoenoplectiella articulata (L.) Lyeo SKM313 | Jointed Sedge | Cyperaceae | Seed | Wound due to castration: seed dust is boiled in coconut oil and applied topically on the affected area thrice a day for 3 days | 2 | Goat |
| 127                    | Semecarpus anacardium L.f. SKM313          | Marking nut | Anacardiaceae | Seed | Liver trouble: 2 or 3 seeds are fed once a week to strengthen liver function | 3 | Cow |
| 128                    | Senna occidentalis (L.) Link SM510         | Antbush    | Fabaceae | Root | Diarrhea: root (5–7 g) paste is given orally twice a day for 5 days | 5 | Sheep |
| 129                    | Dracaena angolensis (Welw. ex Carrière) Byng & Christenh. SKM110 | Spear | Asparagaceae | Root | Swelling wart: root paste is applied twice a day on the affected area till the cure | 2 | Goat |
| 130                    | Sesamum indicum L. Sesame SKM31            | Sesame     | Pedalaceae | Seed | Retention of milk: seed (200 g) paste is soaked in water along with mustard cake for 6–8 h and given orally once a day on alternate days for a week | 6 | Milch buffalo |
| 131                    | Seseli diffusum (Roxb. ex Sm.) Santapau & Waghi SKM788 | Indian celery | Apiaceae | Whole plant | Urinary incontinence: a bunch of freshly collected plants in its fruiting stage is given orally once a day till cured | 2 | Cow |
| 132                    | Smlax ovalifolia Roxb. ex D.Don SKM201     | Kumarka    | Smlacaceae | Root | 1) Body ache: root paste is mixed with mud of termite hill and applied on the affected area | 3 | Bullock |
|                        |                                            | Leaf       |          |            | 2) Indigestion: fresh leaves are chopped and fed once in the morning for 15 days | 2 | Sheep |
| 133                    | Solanum violaceum Ortega SKM119           | Indian Nightshade | Solanaceae | Whole plant | Poisoning of grazing animal: one plant is slightly toasted first and then made into small pieces and fed immediately along with the cattle feed | 5 | Cow, bullock, buffalo, horse |
| 134                    | Solanum sisymbriifolium Lam. SKM29        | Sticky nightshade | Solanaceae | Whole plant | Infectious disease: one mature plant in its fruiting stage is collected, ground finely, and given thrice a week | 6 | Cow |
| 135                    | Solanum torvum Sw. SKM601                 | Turkey Berry | Solanaceae | Fruit | Bloat: 9–11 pieces of ripe fruits are given once a day for 3 days | 2 | Sheep, goat |

(Continued on following page)
TABLE 1 (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (●, new EVMPs reported from India; ◆, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ◈, new in respect of the plant parts used).

| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|---------|---------------------------------------------|-------------|--------|------------|-----------------------------------------------------------------|----------------------------------------|---------------|
| 136     | Soymida febrifuga (Roxb.) A. Juss. SKM99    | Indian Redwood Meliaceae | Bark   | Leaf       | 1) Dysentery: juice is prepared from freshly collected bark and given twice a day for 3 days 2) Retention of placenta: nine leaves are fed in the first morning for 2 days | 7           | Cow           |
| 137     | Sphaeranthus indicus L. SKM901              | East Indian Globe Thistle Asteraceae | Whole plant |            | Wound: plant paste is applied as a poultice on the affected area | 5           | Bullock       |
| 138     | Strychnos nux-vomica L. SKM902             | Nux vomica Loganiaceae | Bark   |            | Bloody dysentery: 5–10 g stem bark is made into a paste with common salt and fed along with cattle feed once a day till cured | 4           | Cow           |
| 139     | Svertia chirayita (Roxb.) H.Karst           | Chirayata Gentianaceae | Whole plant |            | Constipation: certain amount of dried plant along with rock salt is made into powder and given twice a day for several days | 6           | Cow, buffalo   |
| 140     | Tamarindus indica L. SKM211                | Tamarind Fabaceae | Fruit pulp |            | Food poisoning: fruit pulp (250 g) is mixed with 2 L of water and given immediately  Dysentery: one teaspoon full of dust of mature fruit is given once in the morning for 3 days | 5           | Cow           |
| 141     | Tamalinidia uliginosa (Retz.) Tirveng & Sastre SKM1138 | Divine Jasmine Rubiaceae | Fruit |            | Dysentery: one teaspoon full of dust of mature fruit is given once in the morning for 3 days  Constipation: certain amount of dried plant along with rock salt is made into powder and given twice a day for several days | 2           | Goat          |
| 142     | Termomycetes heimi Natarajan ◆ SKM124       | Termite mound mushroom Lyophyllaceae | Whole fruit body |            | General weakness; dust is given with rice bran once a day thrice a week for 1 month | 2           | Bullock, buffalo |
| 143     | Tinospora sinensis (Lour.) Merr. SKM251    | Heart-leaved moonseed Menispermaceae | Stem |            | Poor lactation: mature stem (500 g) is boiled with particulate rice and fed daily for 10–15 days | 5           | Milch cow      |
| 144     | Triantehma portulacastrum L. SKM909        | Desert horsepurslane Aizoaceae | Leaf   |            | Opacity of cornea; leaf juice is applied on the affected eye till cured | 2           | Goat, sheep    |
| 145     | Tribulus terrestris L. ◆ SKM710            | Puncture Vine Zygophyllaceae | Leaf   |            | Blot: fresh leaves are fed with a pinch of rock salt twice a day for 3 days | 3           | Sheep          |
| 146     | Typhonium trilobatum (L.) Schott ♥ SKM811  | Bengal Arum Araceae | Tuber  |            | Swelling wart: tuber paste applied on the affected area twice a day for 5 days | 4           | Goat          |
| 147     | Urena lobata L. SKM304                      | Caesarweed Malvaceae | Root   |            | Body ice; juice made from fresh root is applied on the whole body once a day for consecutive 3 days | 3           | Cow           |
| 148     | Utria lagoesploidos (L.) DC. ◆ SKM812       | Hare Foot Utraria Fabricaceae | Whole plant |            | Diarrhea of small ruminant; whole plant is chopped finely and fed once in the evening for 3–5 days | 2           | Goat          |
| 149     | Vanda tessellata (Roxb.) Hook, ex G.Don SKM451 | Grey orchid Orchidaceae | Aerial root |            | Swelling wart: root made into a paste and applied topically on the affected area once a day for 7 days | 2           | Goat          |
| 150     | Holarrhena pubescens Wall. ex G.Don SKM03   | Bitter Oleander Apocynaceae | Seed   |            | Fever with stomach problems and pulmonary congestion: seeds (Indradhara) are made into a paste along with potassium nitrate (4:1) and administered twice a day for 5 days | 2           | Cow           |
| 151     | Xanthium strumarium L. SKM301              | Rough cocklebur Asteraceae | Leaf   |            | Retention of urine: leaves are made into a paste along with common salt and applied as a paste | 3           | Cow           |

(Continued on following page)
| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|---------------------------------------------|-------------|--------|------------|---------------------------------------------------------------------------------|----------------------------------------|---------------|
| 152    | *Ziziphus nummularia* (Burm.f.) Wight and Am. & SKM48 | Wild jujube | Rhamnaceae | Leaf       | poultice on the lower abdomen once a day for 5–7 days Rhinorrhoea: dried leaves are fired to get smoke in the cowshed where the affected cow is tied for a few hours | 9                        | Cow           |
| 153    | *Ziziphus oenoplia* (L.) Mill. SKM57 | Jackal jujube | Rhamnaceae | Bark       | Suppurating wound: freshly collected bark (250 g) is soaked in water overnight, and the next morning, the wound is washed with this water. This practice is continued daily till cured | 2                        | Bullock       |

### B Polyherbal formulations \((n = 110)\)

| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|---------------------------------------------|-------------|--------|------------|---------------------------------------------------------------------------------|----------------------------------------|---------------|
| 154    | *Abrus precatorius* L. Bambusa bambos (L.) Voss. | —           | —      | Seed Leaf  | Loose motion: 4-5 seeds of *A. precatorius* are given with bamboo leaves once a day for 2-3 days Diarrhea and dysentery: 4-5 *Abrus* seeds are made into paste along with 100 g bamboo leaves and little amount of feather of *Coracias benghalensis* L. (Indian roller, "Nilkantha"), applied orally once a day for 3 days | 7                        | Goat          |
| 155    | *Abrus precatorius* L. & Bambusa bambos (L.) Voss. | —           | —      | Seed Leaf  | Mastitis: roots of *L. nepetifolia* and *A. precatorius* (2:1) is made into a paste and applied as a poultice on the mammary gland twice a day for 3 days | 16                       | Cow           |
| 156    | *Leonotis nepetifolia* (L.) R.Br. & *Abrus precatorius* L. | —           | —      | Root        | Cold and cough: 5 g root of *A. precatorius* and 21 grains of black pepper are made into a paste and given once a day in empty stomach in the morning for consecutive 3 days | 2                        | Milch cow     |
| 157    | *Abrus precatorius* L. *Piper nigrum* L. | Black pepper | Piperaceae | Root Fruit  | Loose motion: dried latex of catechu (200 g), chalk (1 kg), and iron sulfate (200 g) are ground into powder separately and then mixed with root powder of *Piper cubeba* (200 g) and administered twice a day for 2-3 days. Simultaneously with this administration, the paste of sunned rice is given once a day. Dose: for goat—5 to 10 g, for cow—50 g or more and buffalo—100 g or more | 2                        | Bullock, buffalo |
| 158    | *Senegalia catechu* (L.f.) P.J.H.Hurter and Mabb. *Piper cubeba* L.f. | Java pepper | Piperaceae | Root        | Poor health: a decoction is prepared from bark of *A. marmelos* (250 g), bark of *V. nilotica* subsp. indica (250 g), bark of *A. salvifolium* (150 g), bark of *A. nilotica* (150 g), rhizome of *N. (100 g), and and whole plant of *T. natans* (100 g) | 2                        | Cow, bullock   |

(Continued on following page)
### TABLE 1 (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (♦, new EVMPs reported from India; ▲, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ♦, new in respect of the plant parts used).

| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|---------|---------------------------------------------|-------------|--------|------------|---------------------------------------------------------------------------------|-----------------------------------------|----------------|
| 160     | *Achyranthes aspera* L. ▲                   | —           | —      | Root       | Fever of gravid cow: roots of *Achyranthes*—2 to 3 pieces (5–7 cm long), 2 spoonfuls of seeds of *Nigella sativa* are ground together into a paste and fed along with mucilaginous extract of *Aloe vera* leaf (locally known as “Musabbar”) twice a day for 2–3 days | 11                        | Gravid cow |
| 161     | *Achyranthes aspera* L.                     | —           | —      | Root       | Fever: root of one mature *A. aspera* plant and 9 grains of black pepper are made into a paste and mixed with water to be fed twice a day for 5–7 days | 13                        | Bullock |
| 162     | *Solanum glaucophyllum* Desf. SKM193       | Waxy leaf   | Solanaceae | Stem       | Fever: three pieces of dried stem of *S. glaucophyllum* (5 cm), whole plant of *S. dulcis* (100 g), and root of *A. aspera* (50 g) are made into a paste and given orally twice a day for 7 days | 3                         | Cow |
| 163     | *Achyranthes aspera* L.                    | —           | —      | Root       | Fever of heifer (immature cow): roots of *Achyranthes* and *S. surattensis* (3:1) are made into a paste and given orally once a day for 3 days | 5                         | Heifer |
| 164     | *Pleurolobus gangeticus* (L.) J.St.-Hil. ex H.Ohashi and K.Ohashi ▼ SKM171 | Sal Leaved nightshade | Fabaceae | Whole plant | Hemothagic septicemia (HS): one entire plant of *Pleurolobus*, 5–7 g of *Achyranthes* roots, and 21 grains of black pepper are made into a paste together, fed along with old molasses once a day till the cure | 9                         | Cow |
| 165     | *Adiantum philippense* subsp. philippense ♦ SKM180 | Maidenhair fern | Pteridaceae | Whole plant | Fever: a handful of freshly collected whole plant of *A. philippense* subsp. philippense is given orally along with black pepper once a day till the cure | 3                         | Goat, sheep |
| 166     | *Aerva javanica* (Burm. f.) Juss. ex Schult Euphobia explanata Lindl. ♦ SKM200 | Flattened Euphobia | Orchidaceae | Bulb      | Lameness in the hind leg due to stiffness of medial collateral ligament (“Shir-taam”): bulbous root of *E. explanata*, tender shoot of *A. javanica*, aerial part of *A. paniculata*, soil of crab hole, and little amount of camphor are ground together and mixed well, heated slightly, and applied as a poultice on the affected leg twice a day for 5–7 days | 3                         | Bullock |
| 167     | *Ouret lanata* (L.) Kuntze SKM123           | Aerva       | Amaranthaceae | Whole plant | Wound in the large intestine: whole plant of *A. lanata* (100 g) is made into a paste along with 10 g of freshly collected turmeric (Curcuma longa) and 10 g of black cumin (N. sativa) or ajwain | 3                         | Bullock |

(Continued on following page)
| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|---------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------------|----------------|
| 168    | Oreut lanata (L.) Kuntze ♥                   | —           | —      | Whole plant | Foot and mouth disease (FM): 200 g of *A. lanata* plant is made into a paste along with freshly collected turmeric (50 g) and black cumin seed (5 g), given orally as well as applied topically on the affected area once a day till cured | 3 | Cow, bullock, buffalo |
|        | Curcuma longa L.                              | —           | —      | Rhizome    |                                                                                   |                                        |                |
|        | Nigella sativa L.                             | —           | —      | Seed       |                                                                                   |                                        |                |
| 169    | Alangium salviifolium (L.f.) Wangerin         | —           | —      | Bark       | Retention of the placenta: powder of dried flowers of *B. ceiba* (10 g) is mixed with the powdered stem bark (5 g) of *A. salviifolium* and given to the animal for quick expulsion of the placenta after vaginal delivery of the newborn | 2 | Cow |
|        | Wangerin                                      | —           | —      | Flower     |                                                                                   |                                        |                |
|        | Bombax ceiba L.                               | —           | —      | Flower     |                                                                                   |                                        |                |
| 170    | Myristica fragrans Houtt.                      | Nutmeg      | Myristicaceae | Fruit Stem | Body ache: five fruits of *Myristica* and 250 g of *Amaranthus* stem are made into a paste and applied as a poultice on the affected body part. Before this practice, the affected area is compressed with hot saline water twice a day, and simultaneously an Ayurvedic product is known as "Chobchini/Topchini" is fed along with sugar in the quantity of 5 g once in a day | 2 | Bullock, buffalo |
|        | *Amaranthus spinosus* L.                      | —           | —      | Root       | Fever: root of *Amaranthus*—2 pieces (6-7 cm long), mustard seed (50 g), and 21 grains of black pepper are ground together and mixed with holy water. The mixture is then administered once a day for at least 3 days | 2 | Cow |
|        | *Piper nigrum* L.                             | —           | —      | Fruit      |                                                                                   |                                        |                |
|        | *Brassica nigra* (L.) W.D.J.Koch SkM26        | Black mustard | Brassicaceae | Seed       |                                                                                   |                                        |                |
| 171    | *Lysimachia arvensis* (L.) U.Manns and Anderb. SKM721 | Scarlet pimpernel | Primulaceae | Whole plant | Throat sore: whole plant of *L. arvensis* (500 g) made into a paste with 100 g of fresh *Curcuma* and applied topically on the affected area twice a day for 3–5 days followed by hot compress | 2 | Bullock |
|        | *Curcuma longa* L.                            | —           | —      | Rhizome    | Curcuma and applied topically on the affected area twice a day for 3–5 days followed by hot compress                                                                 |                                        |                |
| 172    | *Solanum virginianum* L.                      | Pineapple   | Bromeliaceae | Leaf       | Helminthiasis: 250 g of leaf is made into a paste and given with 9–21 grains of black pepper once at night for consecutive 5 days | 5 | Bullock |
|        | *Andrographis paniculata* (Burm.f.) Nees      | —           | —      | Root Shoot | High fever: an entire mature plant of *A. paniculata* and one-piece of root (5 cm) of *S. surattense* are made into a paste along with 10 g of black pepper and 10 g of Ajwain. To mature one, this whole mixture of plant | 4 | Cow |
|        | *Trachyspermum ammi* (L.) Sprague             | —           | —      | Fruit      |                                                                                   |                                        |                |

(Continued on following page)
| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|------------------------|---------------------------------------------|-------------|--------|------------|-----------------------------------------------------------------------------|--------------------------------------|---------------|
| 175                    | Andrographis paniculata (Burm.f.) Nees, Piper nigrum L. | — — | Whole plant | Snakebite; one mature plant and 21 grains of black pepper are made into a paste and mixed with water to make a water emulsion; orally | 9 | Bulock |
| 176                    | Andrographis paniculata (Burm.f.) Nees, Curcuma longa L. | — — | Fruit | Foot and mouth disease (FM); dried aerial part of one mature plant is made into a paste along with fresh turmeric (5 g) and given orally mixed with old molasses once a day for 7 days | 4 | Cow, bullock |
| 177                    | Aristolochia indica L. SKM63, Syzygium aromaticum (L.) Merr. and L. M. Perry, Piper nigrum L. | Indian Birthwort, Clove | Aristolochiaceae, Myrtaceae | Root Dyspepsia of the calf: 15–20 g of Aristolochia root, 5 g of clove, and 5 g of black pepper are crushed and fed along with the cattle feed twice a day for a few days | 3 | Heifer |
| 178                    | Aristolochia indica L. Piper nigrum L. | — — | Root | Snakebite; three pieces of the root of Aristolochia (5–6 cm in size) are made into a paste along with 21 grains of black pepper and given orally twice a day after an interval of 8 h | 17 | Bulock |
| 179                    | Asparagus racemosus Wild. Piper nigrum L. | — — | Root | Haematuria: fresh root is given with black pepper | 7 | Gravid cow |
| 180                    | Alstonia scholaris (L.) R. Br, Piper nigrum L. | — — | Bark | Loose motion: decoction is prepared from 100 g of Alstonia bark and 9 grains of black pepper, given orally twice a day for 3 days | 4 | Bullock |
| 181                    | Alstonia scholaris (L.) R. Br, Piper nigrum L. | — — | Bark | Helminthosis: 250 g of Alstonia bark, 21 grains of black pepper, and a pinch of rock salt are made into a paste, given orally once at night for 7 days | 3 | Goat, sheep |
| 182                    | Azadirachta indica A. Juss. Curcuma longa L. | — — | Leaf | Dysentery: leaves of Azadirachta and rhizome of Curcuma (4:1) are made into a paste by maintaining some holy rituals and given orally twice a day for 3 days | 9 | Cattle |
| 183                    | Azanza lampas (Cav.) Alef. SKM435, Piper nigrum L. | Common mallow | Malvaceae | Root Poor lactation: 3–4 pieces of Azanza root (5 cm) and 11 grains of black pepper are made into a paste and given once a day for 15 days | 3 | Milch cow |
| 184                    | Barleria prionitis L. Piper nigrum L. | — — | Shoot | Post-partum debility: the plant parts like 250 g shoot of B. prionitis and 21 grains of black pepper are ground together to prepare a paste and administered orally twice a day for 1 month | 3 | Cow |
| 185                    | Biophytum sensitivum (L.) DC. SKM640, Piper nigrum L. | — — | Root | Stop mastication: 3-4 roots (5 cm) are fed with 21 grains of black pepper once a day for at | 2 | Bulock |

(Continued on following page)
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (●, new EVMPs reported from India; ▲, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ●, new in respect of the plant parts used).

| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|-------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------------|---------------|
| 186    | Boerhavia diffusa L. SKM165                | Red Spiderling | Nyctaginaceae | Stem | least 7 days to regularize the digestion process | Postparturition bleeding: 100 g of the freshly collected stem of *B. diffusa* is made into a paste along with 9–11 black pepper and fed once a day for 3 days | 4 | Buffalo |
|        | *Piper nigrum* L.                         | —           | —      | Fruit     | Body swelling due to cold (*Jol-sannipat*); leaf of *Vitex*, leaf of *Datura*, and shoot of *B. vitis-Idea* (2:2:1) are made into a paste and mixed with the soil of crab hole or sunned rice (*Atop-cha*), heated for some time, and lukewarm paste is applied as poultice throughout the body twice a day | 6 | Bullock |
| 187    | *Vitex negundo* L. SKM208                 | Chinese chaste tree | Lamiaceae | Leaf | Dysuria (retention of urine and difficulty in micturition); leaves of *B. pinnatum* (9–12 pieces) and 9–21 grains of black pepper are made into a paste and given orally twice a day for 7–10 days | Cough: 5–6 leaves of *B. lacera*, 10 g of *T. ammi*, 10 g of *C. longa*, or 25 g of *Z. officinale* are made into a paste and given orally in the morning and evening of a day for 7 days | 2 | Heifer |
|        | *Datura stramonium* L.                    | —           | —      | Leaf     | Fever: 2-3 leaves are made into a paste along with 21 grains of black pepper and given orally twice a day for 3–5 days | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | 3 | Cattle |
|        | *Breynia vitis-idaea* (Burm.f.) C.E.C.Fisch. SKM27 | — | Indian Snowberry | Shoot | Body swelling due to cold: bark of *C. procera*, leaves of *J. curcas*, and fresh turmeric (*C. longa*) are made into a paste (2:2:1) and applied as a poultice on the affected area once a day for 5–7 days | Body swelling due to cold: bark of *C. procera*, leaves of *J. curcas*, and fresh turmeric (*C. longa*) are made into a paste (2:2:1) and applied as a poultice on the affected area once a day for 5–7 days | 3 | Bullock |
| 190    | *Kalanchoe pinnata* (Lam.) Pers. SKM55    | Cathedral Bells | Crassulaceae | Leaf | Urinary tract infection with slight fever: 10 g of the root of *C. spinosa* is made into a paste and given with 9 grains of black pepper once a day for 7 days | Urinary tract infection with slight fever: 10 g of the root of *C. spinosa* is made into a paste and given with 9 grains of black pepper once a day for 7 days | 2 | Goat |
|        | *Piper nigrum* L.                         | —           | —      | Fruit     | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | 3 | Cow, bullock, buffalo, goat, sheep |
| 191    | *Calotropis gigantea* (L.) W.T. Aiton      | —           | —      | Root     | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | 3 | Cow, bullock, buffalo, goat, sheep |
|        | *Sodom apple* W.T. Aiton SKM79            | —           | —      | Bark     | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | 3 | Bullock |
|        | *Physic nut* W.T. Aiton SKM37             | —           | —      | Leaf     | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | 3 | Bullock |
|        | *Curcuma longa* L. W.T. Aiton             | —           | —      | Rhizome  | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | Poisoning (*Sapure*): roots of *Calotropis* and black pepper (3:1) are made into a paste and administered along with card or whey in two ways—3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | 3 | Bullock |
| 192    | *Catunaregam spinosa* (Thurb.) Tinweng. SKM681 | Mountain pomegranate | Rubiaceae | Root | Swelling of the body due to cold (*Jol-sannipat*): whole plant of *C. trifolia*, bark of *T. jol-sannipat* | Swelling of the body due to cold (*Jol-sannipat*): whole plant of *C. trifolia*, bark of *T. jol-sannipat* | 9 | Cow |
|        | *Piper nigrum* L.                         | —           | —      | Fruit     | Swelling of the body due to cold (*Jol-sannipat*): whole plant of *C. trifolia*, bark of *T. jol-sannipat* | Swelling of the body due to cold (*Jol-sannipat*): whole plant of *C. trifolia*, bark of *T. jol-sannipat* | 9 | Cow |

(Continued on following page)
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (●, new EVMPs reported from India; ●, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ●, new in respect of the plant parts used).

| Sl. No. | Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|---------------|--------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|--------------------------------------------|---------------|
| 195    | Celastrus paniculatus Wild. SKM12 | Black Oil Plant | Celastraceae | Seed   | Rheumatoid arthritis: seed oil of C. paniculatus and S. indicum are mixed in equal proportion and applied externally throughout the affected leg twice a day for at least 15 days | 3 Cow |
| 196    | Cissus quadrangularis L. Ficus religiosa L. Terminalia arjuna (Roxb. ex DC.) Wight and Arn. | — | — | — | Swelling wart: stem of C. quadrangularis, root bark of F. religiosa and bark of T. arjuna are taken in equal amounts and made into a paste and applied as a poultice on the affected area and tied tightly with cloth and left as it is for a minimum of 15 days | 3 Buffalo |
| 197    | Cissus quadrangularis L. Piper nigrum L. | — | — | — | Helminthosis: 100 g of Cissus stem is made into a paste along with 9 grains of black pepper and fed once in the morning for 5–7 days | 2 Buffalo |
| 198    | Guilandina bonduc L. Piper nigrum L. | — | — | — | Retention of placenta: decoction is prepared from 250 g root of G. bonduc and 21 grains of black pepper and given orally twice a day till the cure | 4 Cow |
| 199    | Capparis zeylanica L. Piper nigrum L. | — | — | — | Mastic: leaf of C. zeylanica (50 g) and 21 grains of black pepper are made into a paste together and given orally twice a day | 2 Milch cow |
| 200    | Chamaecrista mimosaoides (L.) Greene SKM347 Piper nigrum L. | Feather-leaved Cassia | Fabaceae | Root | Stomach pain: 5 g of root paste of Chamaecrista is given with nine grains of black pepper twice a day for 5–7 days | 2 Goat |
| 201    | Tragia involucrata L. SKM75 Baccharoides anthelmintica (L.) Moench | Indian stinging nettle Euphorbiaceae | Root | Fruit | Fever: the root of Tragia (50 g), fruit of B. anthelmintica (10 g), and rock salt (5 g) are made into a paste and fed twice a day for 3 days | 3 Cow |
| 202    | Chrysopogon zizanioides (L.) Roberty SKM536 Cyperus rotundus L. SkM121 Datura stramonium L. | Vetiver grass Java grass Root | Poaceae Cyperaceae | Root | Headache: mature root of D. stramonium is made into a paste along with the roots of C. zizanioides and C. rotundus (2:1:1), applied as poultice on head twice a day for 2-3 days. In severe cases, little amount of horn dust of spotted deer is added with this preparation and applied in the same way | 2 Bullock |
| 203    | Cissampelos pareira L. Piper nigrum L. | — | — | — | Dog bite: water emulsion is prepared with root (10 g) paste and 21 grains of black pepper | 9 Goat, sheep |
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal ($n=306$). Symbols denote new reports about EVMPs (●, new EVMPs reported from India; ▲, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ◆, new in respect of the plant parts used).

| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|-------------------------|--------------------------------------------|-------------|--------|------------|---------------------------------------------------------------------------------|---------------------------------------|----------------|
| 204 Cissampelos pareira L. Piper nigrum L. | — — | Leaf Fruit | Fever: 4–5 leaves are given along with nine grains of black pepper twice a day for 3 days | 2 Calf |
| 205 Cissampelos pareira L. Azadirachta indica A. Juss. Curcuma longa L. | — — | Whole plant Leaf Rhizome | Poisoning (Asor); a paste is prepared from the whole plant of C. pareira (250 g), leaf of A. indica (6 g), and fresh rhizome of C. longa (5 g) and applied topically all over the body | 3 Milch cow |
| 206 Cocculus hirsutus (L.) W.Theob. Zingiber officinale Roscoe | — — | Leaf Rhizome | Urinary incontinence: the leaf of C. hirsutus (100 g) is made into a paste along with a little bit of Zingiber and rock salt, given once in the morning for 10–15 days | 2 Cow |
| 207 Cocculus hirsutus (L.) W.Theob. Scymidia febrifuga (Roxb.) A. Juss. | — — | Whole plant Bark | Post-partum debility: an infusion is made from dried plants of C. hirsutus and dried bark of S. febrifuga (3:1) and given orally once a day for 15 days | 2 Cow |
| 208 Holarrhena pubescens Wall. ex G.Don Curcuma longa L. | — — | Seed Rhizome | Bloat (Dhomnamba); 10 g seeds of Wrightia (Indrajrob), rhizome of Curcuma (250 g), molasses (500 g), and potassium nitrate (5 g) are crushed into a paste together and administered twice a day for a few days; simultaneously lukewarm water is drenched | 2 Bullock, buffalo |
| 209 Swertia chirayita (Roxb.) H.Karst. Curcuma longa L. Tragia involucrata L. ▲ Piper nigrum L. | — — | Whole plant Rhizome Root Fruit | Fever with ruminal atony; dried whole plant of S. chirayita (25–30 g), rhizome of Curcuma (50 g), roots of Tragia (5–10 g), black pepper (10 g), and potassium nitrate (5 g) are made into a paste together and administered twice a day till recovery | 2 Buffalo |
| 210 Madhuca longifolia (J.Koenig ex L.) J.F.Macbr. SKM187 Curcuma longa L. | Mahua tree Sapotaceae Rhizome | Body swelling due to poisoning (Asor); bark of M. longifolia and rhizome of C. longa (8:1) is made into a paste and applied both topically and orally at the same time of a day twice for 3 days | 7 Bullock |
| 211 Murraya koenigii (L.) Spreng. ▼ SKM985 Curcuma longa L. | Curry leaf tree Rutaceae Rhizome | Drowsiness of small ruminants (Jhimuni); leaves of M. koenigii and fresh curcuma (4:1) are made into a paste and applied topically on the whole body for consecutive 7 days | 6 Sheep, goat |
| 212 Neolamarckia cadamba (Roxb.) Bosser Curcuma longa L. | — — | Leaf Rhizome | Constipation; leaves of N. cadamba (2 kg) and fresh rhizome of C. longa (100 g) are made into a paste, and it is fed with molasses (250 g) as a laxative twice a day for 2 days | 7 Cow |

(Continued on following page)
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (●, new EVMPs reported from India; ▲, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ●, new in respect of the plant parts used).

| Sl. No. | No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|---------------------|---------------------------------------------|-------------|--------|------------|------------------------------------------------------------------------------------------------|------------------------------------------|----------------|
| 213    | Neolamarckia cadamba (Roxb.) Bosser SKM24 Plantago ovata Forsk. Curcuma longa L. Brassica nigra (L.) K. Koch | Burflower-tree Psyllium — — | Rubiaceae Plantaginaceae — — | Leaf Seed Rhizome Fruit | Constipation: leaf of N. cadamba (1.5–2 kg), rhizome of Curcuma (250 g), seeds of Plantago (250 g), and mustard seed (10 g) are made into a paste and given once a day in case of constipation | 4 Buffalo |
| 214    | Curcuma aromatica Salisb. • SKM86 Piper nigrum L. | Wild turmeric — — | Zingiberaceae — — | Rhizome Fruit | Food poisoning: rhizome of C. aromatica (10–15 g) is made into a paste along with 9–21 grains of black pepper and fed thrice a day for consecutive 2 days | 2 Goat |
| 215    | Rotheca serrata (L.) Steane & Mabb. • SKM315 Zingiber officinale Roscoe Trachyspermum ammi (L.) Sprague | Blue fountain bush — — | Lamiaceae — — | Root Rhizome Fruit | Fever: one piece of root of R. serrata (5 cm of length), a little amount of ginger, and a teaspoon of ajwain are made into a paste and given orally twice a day for 3 days | 2 Goat, sheep |
| 216    | Clerodendrum indicum (L.) Kunze SKM88 Piper nigrum L. | Tubeflower — — | Lamiaceae — — | Stem Fruit | Snakebite: three pieces of the stem (5 cm of length) and 21 grains of black pepper are made into a paste and given orally as soon as possible | 3 Cow |
| 217    | Volkameria inermis L. Allium sativum L. Ferula assa-foetida L. | — — — — — — — — | Asafoetida Apiaceae — — | Leaf Bulb Gum | Rheumatoid arthritis (Shimola rogi): leaf of V. inermis (1 kg), 5 cloves of garlic, and 5 g of asafoetida (Go-hing) are made into a paste and applied on the affected area of the leg twice a day for 7–9 days | 2 Cow |
| 218    | Clerodendrum infortunatum L. Soymida febrifuga (Roxb.) A. Juss. | — — — — | — — | Root Bark | General weakness: an infusion is prepared from dried powder of root of C. infortunatum and Soymeda bark (1:4) and given once a day for at least 15 days | 2 Cow, buffalo |
| 219    | Colocasia esculenta (L.) Schott Litsea glutinosa (Lour.) C. B. Rob. | — — — — | Corm Bark | Stiffness of shoulder: bark of Litsea and corm of C. esculenta are made into a paste (1:1) and applied as a poultice on the affected area twice a day till the cure | 2 Bullock, buffalo |
| 220    | Cynodon dactylon (L.) Pers. SKM122 Zingiber officinale Roscoe | Bermuda grass — | Poaceae Rhizome | Whole plant | Dyspepsia of the calf: a bunch of C. dactylon and a little amount of ginger are made into a paste and fed with old molasses once a day for 15 days | 2 Calf |
| 221    | Datura stramonium L. Piper nigrum L. | — — — | — — | Root Fruit | Swelling of body due to poisoning (Sapure): root of Datura and black pepper (3:1) are made into a paste and administered along with card or whey in two ways; 3/4 parts of the preparation is administered orally twice a day and 1/4 parts of the preparation is applied on the area showing inflammation or swelling due to any kind of poisoning | 3 Cow, goat, sheep |
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (♦, new EVMPs reported from India; ♦, new in respect of the diseases cured; ▲, new in respect of remedy preparation modes; ◀, new in respect of the plant parts used).

| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|-------------------------|---------------------------------------------|-------------|--------|------------|-----------------------------------------------------------------|----------------------------------------|---------------|
| 222                     | Pleurolobus gangeticus (L.) J.St.-Hil. ex H. Ohashi & K. Ohashi ♦ | Whole plant | —     | Bloody dysentery: 100–150 g of the plant along with 21 grains of black pepper is made into a paste and given once a day for 3 days | 11 | Cow |
| 223                     | Grona triflora (L.) H. Ohashi & K. Ohashi SKM197 | Three-flower tick-trefoil Sweetcane | Fabaceae | Root | Delayed onset of estrous cycle: the root of G. triflora is made into a paste and given with a tablespoon of concentrated juice of S. bengalense stem. This practice is repeated each morning for at least 15 days | 2 | Heifer |
| 224                     | Dillenia pentagyna Roxb. Piper nigrum L. | Leaf | —     | Ulcer in the intestine: leaves (5-6 pieces) are made into a paste along with 11 black pepper (P. nigrum) and fed once a day for 3 days | 2 | Heifer, goat, sheep |
| 225                     | Wattakaka volubilis (L.f.) Stapf. | Stem | —     | Liver trouble: stem of W. volubilis (10 cm) made into a paste along with fresh turmeric (C. longa) and ajwain (T. ammi), given orally once a day for 5 days | 3 | Cow, bullock |
| 226                     | Curcuma longa L. | Rhizome | —     | Masistis: 4-5 pieces of leaves of W. volubilis are made into a paste along with little fresh turmeric (C. longa), applied as poultice once a day till cured | 3 | Milch buffalo |
| 227                     | Wattakaka volubilis (L.f.) Stapf. | Stem | —     | Haematuria: all the four parts, such as stem of W. volubilis, fresh rhizome of C. longa, fruits of T. ammi, and C. sativum seed (4:1:1:1), are made into a paste and given orally | 2 | Cattle |
| 228                     | Curcus longa L. | Rhizome | —     | Infectious diseases: one or two freshly collected Drosera plants are fed wrapping with bamboo leaves thrice a week during the onset of certain infectious diseases | 3 | Cow, buffalo |
| 229                     | Echinops echinatus Roxb. Scoparia dulcis L. | Roots | —     | Stomatome: root of E. echinatus and whole plant of S. dulcis (2:1) is made into a paste, mixed with lukewarm water, and given orally once in the morning for 15 days | 5 | Buffalo |
| 230                     | Leucas cephalotes (Roth) Spreng. SKM15 | Shoot | —     | Rhinorrhoea (Sonra rog): freshly collected branches of both the plant Leucas and Eclipta are taken in equal amount, made shade dry, and powdered, then mixed with mustard oil and vermillion. 2 spoonfuls of this preparation is administered in each nasal opening twice a day | 4 | Cow |
| 231                     | Glochidion multiflorulare (Rottler ex Wild.) Voigt SKM1123 | Bark | —     | Stiffness of shoulder: barks of G. multiflorulare and M. longifolia (2:1) are made into a paste and poultice once a day till cured | 5 | Bulok, buffalo |

(Continued on following page)
| Sl. No. | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|--------|-------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|------------------------------------------|----------------|
| 232    | Madhuca longifolia (J.Koenig ex L.) J.F.Macbr. | —           | Bark   | —          | applied as a poultice on the affected shoulder thrice a day for 3-4 days       | 3                                        | Cow            |
| 233    | Hemidesmus indicus (L.) R.Br. SKM827         | Indian sarsaparilla | Apocynaceae | Root | Sore in the mouth: the root of H. indicus is made into a paste along with C. longa and smeared on the tongue and other affected areas of the oral cavity | 2                                        | Goat           |
| 234    | Leea asiatica (L.) Ridsdale                | —           | Vitaceae | Root | Food poisoning: 20–25 g of the root is made into a paste along with 21 grains of black pepper and given orally once for 3 days | 2                                        | Milch cow      |
| 235    | Vicia lens (L.) Coss. & Germ.               | Lentil      | Fabaceae | Seed | Mastitis: seeds of V. lens are made into a paste along with C. longa and applied as a poultice on the painful udder thrice a day till cured | 2                                        | Goat           |
| 236    | Leonotis nepetifolia (L.) R.Br. Bambusa bambos (L.) Voss. | —          | —      | Leaf | Infertility: 5 g seeds of L. nepetifolia are fed, wrapping with bamboo leaves once a day for regularizing the estrous cycle | 3                                        | Buffalo        |
| 237    | Lygodium flexuosum (L.) Sw. SKM180           | Maidenhair creeper | Schizaeaceae | Root | Fever: little amount of roots is made into a paste along with 9 grains of black pepper and fed once a day for 3–5 days | 2                                        | Goat           |
| 238    | Xenostegia tridentata (L.) D.F.Austin & Staples SKM460 | —          | Convolvulaceae | Whole plant | Stomachache: entire X. tridentata plant (15–20 g) and 21 grains of black pepper are made into a paste and given orally once a day in the morning for 3 days | 2                                        | Goat           |
| 239    | Ochna obtusata DC. SKM816                  | Ramdhan Champa | Ochnaceae | Root | Swelling of the body due to poisonous bite (Sapure); the root of Ochna and black pepper (3:1) are made into a paste and administered, mixing with card or whey in two ways—3/4 parts of the preparation are administered orally twice a day and 1/4 parts of the preparation are applied on the area showing inflammation due to any kind of poisoning | 5                                        | Bullock        |
| 240    | Phyloclodium pulchellum (L.) Desv. SKM460   | Showy Desmodium | Fabaceae | Bark | Post parturition bleeding: stem bark of D. pulchellum and little amount of C. longa are made into a paste and given orally twice a day | 2                                        | Cow            |
| 241    | Zingiber officinale Roscoe                  | —           | Zingiberaceae | Rhizome | Post-partum weakness: Preparation 1: rhizome of Z. zerumbet and Z. officinale and fruit of Piper longum are taken in equal amounts, made into | 2                                        | Cow            |

(Continued on following page)
| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|-------------------------|---------------------------------------------|-------------|--------|------------|---------------------------------------------------------------------------------|----------------------------------------|---------------|
| 242 Plumbago zeylanica L. SKM671 | Ceylon leadwort Plumbaginaceae Root | Loose motion: root of *P. zeylanica* (8–10 g), very little amount of fresh rhizome of *C. longa*, and 9 grains of black pepper are made into a paste and given orally twice a day till cure | 3 | Goat, sheep |
| 243 Premna herbacea Roxb. SKM261 | Stemless prenna Lamiaceae Root | Bloat: 5 g of root and 21 grains of black pepper are made into a paste and given orally once in the evening for 3–5 days | 3 | Goat |
| 244 Polygala crotalariaoides Buch.-Ham. ex DC. SKM227 | Indian Milkwort Polygalaceae Root | Dysentery: root of one plant is made into a paste along with 9 grains of black pepper; 1/3rd of it is given at a time thrice a day in an interval of one hour | 5 | Goat, sheep |
| 245 Rauvolfia serpentina (L.) Benth. ex Kurz SKM617 | Indian snakeroot Apocynaceae Root | Poisonous bite: two pieces of roots (3–5 cm) and 21 grains of black pepper are made into a paste with holly water and fed instantly | 3 | Cow, buffalo |
| 246 Ruella tuberosa L. SKM316 | Meadow Weed Acanthaceae Root | Blood dysentery: 4-5 pieces of roots (5–7 cm in length) of *R. tuberosa* are made into a paste along with 21 grains of black pepper and given twice a day for 3 days | 3 | Cow |
| 247 Ruella prostrata Poir. SKM417 | Bell Weed Acanthaceae Whole plant Swelling of the body due to poisonous effect: freshly collected whole plant (200–250 g) is chopped finely and fed with 21 grains of black pepper | 2 | Cow |
| 248 Scoparia dulcis L. | Chinese jujube Rhamnaceae Whole plant Retention of placenta: two or three plants of *S. dulcis* are made into a paste along with one tender shoot of *Z. jujuba*, 5 g of ajwain (*T. ammi*), and 5 gm of turmeric (*C. longa*) and given orally once a day in the morning for 3 consecutive days | 2 | Cow, buffalo |
| 249 Scoparia dulcis L. | Whole plant Shoot Fever: a bunch of dried plants of *S. dulcis* and stem of *S. glaucophyllum* are taken in a 3:1 ratio and made into a paste with black pepper (3–21 grains). The whole preparation is fed at a time once a day for 3 consecutive days | 3 | Cow |

(Continued on following page)
| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|-------------------------|---------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|---------------------------------------|----------------|
| 250                     | Shorea robusta Gaertn. SKM81                | Sal tree    | Dipterocarpaceae | Bark       | Diarrhea: 250 g of the bark of S. robusta is made into a paste with 21 grains of black pepper and given orally once a day till cure (morning and evening) a day for 2 days. | 2          | Cow            |
| 251                     | Sida cordifolia L. SKM190                   | Heart-leaf Sida | Malvaceae | Stem       | Loose motion: stem of S. cordifolia is made into a paste along with cumin seed (C. cyminum) soaked water and administered orally once a day for consecutive 3 mornings. | 7          | Calf, goat, sheep |
| 252                     | Sida rhombifolia L. SKM294                 | Arrowleaf sida | Malvaceae | Root       | Fever: a paste is made with 10–15 g of S. rhombifolia root and 9 grains of black pepper and fed along with mustard cake once a day for 11 days. | 8          | Calf, goat, sheep |
| 253                     | Smilax ovalifolia Roxb. ex D.Don SKM456    | —           | —       | —          | Bloody dysentery: root paste (6–10 g) is administered with 9–21 pieces of black pepper (according to age) once a day for 2 days. | 5          | Cow            |
| 254                     | Spondias pinnata (L. f.) Kurz SKM503       | Hog plum    | Anacardiaceae | Bark       | Fever: 100 g of bark of S. pinnata and 10–15 g of stem of S. glaucophyllum are ground along with black pepper (3–21) pieces and given orally twice a day for 3 days. | 2          | Bullock        |
| 255                     | Svertyia chirayita (Roxb.) H.Karst.        | —           | —       | Whole plant | Fever: dried plant of S. chirayita (6–8 g), root of T. involucrata (5-6 pieces), fruit of black pepper (for goat, 5–15 pieces; for cow, 9–45 pieces; for buffalo, 15–61 pieces). Fixed amounts of all these three plant parts are made into a paste and given twice (morning and evening) a day till cure | 4          | Buffalo, goat |
| 256                     | Tacca leontopetaloides (L.) Kuntze SKM503  | Indian Arrow | Dioscoreaceae | Tuber      | Diarrhea: tuber (10–15) is made into a paste with 9–11 grains of black pepper and given orally once a day for 3 days. | 3          | Buffalo        |
| 257                     | Terminalia chebula Retz. C. longa L.       | Myrobalan   | Combretaceae | Fruit      | Liver trouble with sore in intestine: 5–6 mature fruits of T. chebula, 5 g fresh rhizome of C. longa, and 9–21 grains of black pepper are made into a paste with holly water and fed once a day for 7 days. | 3          | Bullock        |
| 258                     | Tinospora sinensis (Lour.) Merr. SKM382    | —           | —       | —          | Fever with breathing trouble: stem of T. sinensis and rhizome of Z. officinale are made into a paste in a 5:1 ratio and given orally once a day for 9–11 days. | 3          | Bullock        |
| 259                     | Tragia involucrata L. SKM127               | —           | —       | —          | Fever: roots of Tragia and fruits of Capsicum or black pepper are crushed together to make a paste and given with cattle feed once or twice a day (as per cow's age) for 2–3 days. Dose: for adult cow, root of Tragia | 4          | Cow, bullock, buffalo |

(Continued on following page)
### Table 1

| Sl. No. | Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|---------|--------------|--------------------------------------------|-------------|--------|------------|--------------------------------------------------------------------------------|----------------------------------------|----------------|
| 260     | Ventilago denticulata Willd. SKM106 Piper nigrum L. | Red creeper Rhamnaceae Shoot | 30–35 cm), Capsicum (5–6 pieces), or Piper (10–12 pieces) Diarrhea: 3–4 tender shoots (where leaf number will be 5) are made into a paste along with black pepper and given orally once in the morning for 3 consecutive days | 3 | Bullock |
| 261     | Zingiber officinale Roscoe Trachyspermum ammi (L.) Sprague | — | — | — | — | — | — | — | — |
| 262     | Zingiber officinale Roscoe Zingiber zerumbet (L.) Roscoe ex Sm. Piper nigrum L. | — | — | — | — | — | — | — | — |
| 263     | Ziziphus jujuba Mill. Piper nigrum L. | — | — | — | — | — | — | — | — |
| 264     | Abutilon indicum (L.) Sweet SKM101 | Monkey bush Malvaceae Root | Watering of eyes: a small piece of root is touched on the affected eye thrice at a time, then that root piece is touched on the ground and is dipped in a certain site of a nearby pond situated corresponding to the side (left/right) of the affected eye. It is performed on three consecutive Sundays of a month. A regular compress of steam vapor is given simultaneously | 4 | Cow |
| 265     | Abutilon indicum (L.) Sweet | — | — | — | — | — | — | — | — |
| 266     | Adiantum philippense subsp. philippense | — | — | — | — | — | — | — | — |
| 267     | Dioscorea bulbifera L. | — | — | — | — | — | — | — | — |
| 268     | Euphorbia antiquorum L. | — | — | — | — | — | — | — | — |
| 269     | Martynia annua L. | — | — | — | — | — | — | — | — |
TABLE 1 | (Continued) Enumeration of the ethnoveterinary medicinal formulations recorded from the northern part of the laterite zone in West Bengal (n = 306). Symbols denote new reports about EVMPs (▲, new EVMPs reported from India; ◆, new in respect of the diseases cured; ◆◆, new in respect of remedy preparation modes; ●, new in respect of the plant parts used).

| Sl. No. of Formulations | Scientific name and voucher specimen number | Common name | Family | Parts used | Health conditions treated, mode of remedy preparation, and its administration | Number of citations of each formulation | Animal treated |
|------------------------|---------------------------------------------|-------------|--------|------------|-----------------------------------------------------------------|--------------------------------------|---------------|
| 270                    | *Musa paradisiaca* L.                      | —           | —      | Leaf       | the neck of cattle to combat evil forces                        | 2                                    | Gravid cow    |
|                        |                                               |             |        |            | Dysentery: apical part of a tender leaf is wrapped with a piece of cloth smeared with fresh curcuma paste and tied on any of the back legs with black colored ribbon |                                      |               |
| 271                    | *Neptunia prostrata* (Lam.) Ball. SKM551 | Water Mimosa | Fabaceae | Stem       | Poisoneous bite (snake): three dried stems of equal size are tied firmly near the site of the poisonous bite | 2                                    | Cow, bullock  |
| 272                    | *Streblus asper* Lour. SKM203               | Siamese rough bush | Moraceae | Leaf       | Opacity of cornea: 21 leaves are touched on the affected eye and then dipped in a certain site of a nearby pond | 2                                    | Cow           |
| 273                    | *Semecarpus anacardium* L.f.                | —           | —      | Latex      | Lameness in the hind leg (Shir-taana): latex come out of a freshly collected fruit is touched at the base of the hoof of the front legs, horns, and tail | 5                                    | Bullock       |
| 274                    | *Swietenia macrophylla* King. SkM6524      | Broad-leaved Mahogany | Moraceae | Fruit      | Miscarriage: for the safety of the fetus and to prevent miscarriage, dried fruit of *Swietenia* is tied around the neck of the pregnant cow with a red ribbon | 2                                    | Gravid buffalo|
| 275                    | *Tragia involucrata* L.                     | —           | —      | Root       | Maggot infested wounds (between hooves and in genital openings): a piece of root is tied with red colored thread and hung around the neck of affected cattle. This practice is done only on Sunday and Tuesday of the week | 7                                    | Cow           |

Categories based on the *emic* perception of the participants as consulted during focus group discussion.

Fic value was determined for all the 20 diseases categories, ranging from 0.4 to 0.83 (Table 2). Among the recorded disease categories, six categories such as skeletal disorders, helminthiasis, urinary disorders, poisonous effect, retention of milk, and enteric diseases showed very high Fic value (≥0.8); that is, the value is significantly closer to 1, which means there is a greater consensus among the participants. Eleven disease categories were found to have moderate Fic value (0.6 to 0.8). Moreover, three disease categories such as rheumatic disorder (0.57), ophthalmic disorder (0.53), and general health weakness (0.4), have scored low Fic value (<0.6).

The fidelity level or FL values have been determined for all the recorded species used in those 20 diseases categories. Among the recorded plant species, only 23 EVM plants have been identified here as the most important species in the respective disease condition according to their FL value (Table 2).

Further, 68 EVMPs have been considered, which were cited by at least 5% of the participants (FC ≤ 7) for further ranking after comparing the numerical values of frequency of citation (FC), use reports (UR), and the number of uses (NU) and based on the score of CV index (Table 3). After careful comparison of all the values estimated for the 68 plant species, nine species have been considered as culturally most valuable (CV ≥ 0.0025 and frequency of citation ≥20) in the northern laterite region of West Bengal. Those nine plants are *Curcuma longa* L., *Achyranthes aspera* L., *Abrus precatorius* L., *Amaranthus spinosus* L., *Azadirachta indica* A.Juss., *Cissus quadrangularis* L., *Pueraria tuberosa* (Wild.) DC., *Andrographis paniculata* (Burm.f.) Nees, and *Watitkaka volubilis* (L.f.) Stapf.

The Spearman rank-order Correlation analysis has been performed taking the cultural value (CV) index and three basic values of frequency of citation (FC), use report (UR), and use diversity (NU) as variables to check the dependency of one upon another (Table 4). The result expressed very significant correlations among all the variables at p < 0.05. The analysis highlighted that the CV index is highly dependent on the value of FC and UR (correlation coefficient > 0.9, which is near to 1). Therefore, the
versatile uses of a plant species and its familiarity among the participants of a particular area significantly influence the CV index, which reflects the overall importance of the plant species in the culture.

Analysis of the descriptive statistics has revealed that the values of mean (M) and standard deviation are very low in the CV index (M = 0.00044, SD = 0.00147), which indicates the accuracy of estimating the overall cultural importance of a species by this index.

Ten species out of 232 recorded plant species have frequently been used as minor ingredients in 110 different polyherbal preparations along with their respective principal ingredients. Those 10 species are *Piper nigrum* L., *Carcum longa* L., *Zingiber officinale* Roscoe, *Piper longum* L., *Nigella sativa* L., *Trachyspermum ammi* (L.) Sprague, *Cuminum cyminum* L., *Piper cubeba* L.f., *Ferula asa-foetida* L., and *Allium sativum* L. Ranking of preferred species has been made on the basis of scores given to the species considering the use-preference of the ten key participants. The list of most preferred herbal ingredients is presented in Table 5. *Piper nigrum* L. was ranked in the first position with the highest score of 86 out of 100, which revealed that the fruit of this plant is the most preferred ingredient used in polyherbal preparations by the participants of the studied area. The popularity of this plant is assumed easily by observing the value of frequency of citation (FC = 62) and use value (UV = 0.462), which are the highest among the values of these two parameters for all the recorded medicinal species in the studied area.

A total of 68 participants from the Birbhum district and 64 from the Burdwan district participated in the present study. The knowledge similarity between the participants of these two adjacent districts of the studied area has been analyzed employing the Jaccard index (JI). Among the recorded 232 EVMPs, uses of 139 plants were known to the participants from the Burdwan district, and uses of 202 plants were recorded from the participants of the Birbhum district. It has also been observed that uses of 108 EVMPs are common for both districts. The result of JI revealed that, across the 232 plant species, knowledge similarity reaches up to 46.35%, which is quite high as expected because both the districts are adjoining to each other and share similar environmental conditions, ethnic compositions, cultural values, and forest types. Another possible cause for such a high percentage of knowledge similarity is the cross-cultural exchange of EVM knowledge among the inhabitants of these two neighboring districts.

### 4. DISCUSSION

#### 4.1 Is Ethnoveterinary Medicinal Knowledge Depends on the Informant’s Age, Gender, Education, and Knowledge Gathering Pattern?

The involvement of participants indicates gender biases in the present study. However, most of the earlier workers have also experienced a similar type of a male dominating informant composition in their ethnomedicinal explorations carried out in different parts of the world (Hassan et al., 2017; Aziz et al., 2018). In the studied area, the role of women was found restricted mainly in assisting livestock rearing and dairying. Male participants of the study area have much more knowledge about traditional livestock healthcare than the female participants.

The expertise in folk therapy does not depend on the formal education and literacy of the participants but on their keen observation, deep interest, and analytical attitude toward traditional knowledge. Dissemination and gathering of the knowledge occur verbally, and the proficiency of an informant depends on their perception of knowledge and accuracy of practicing the same. In many cases, it has been noticed that the persons with no formal education are much more knowledgeable about folk therapy than the literate ones (Hayta et al., 2014; Umair et al., 2017).

Ninety-one participants interviewed were above 50 years with a minimum of 25 years of experience in livestock healthcare management. They have contributed the maximum number of information (281 formulations, 87%) about the uses of ethnoveterinary medicinal plants. The experience is increased by acquiring knowledge from different sources with an increase in age (Ayantunde et al., 2008). A similar type of scenario has been noticed in many of the ethnomedico-botanical studies carried out earlier by other workers (Piluzza et al., 2015; Bullitta et al., 2018). It is a serious concern that the younger generation of the indigenous community of the northern laterite region of West Bengal is less interested in their age-old therapeutic practices and the traditional knowledge. The gradual inclination toward modern lifestyle, growing faith in allopathic medicine, modern education, and several other cultural changes within the traditional community profoundly influence the younger generation to throw away their forefathers’ culture, which put the age-old knowledge system on the verge of extinction (Cox, 2000).

In the present investigation, the rate of vertical transmission of knowledge is quite higher than the horizontal and oblique ones. In traditional societies, there is a common belief that the religious trust in medicine and its secrecy maintains the purity and supremacy of folk remedies (Giday et al., 2009). Such a kind of social belief restricts the knowledge transmission mainly within the family members. It is identified as one of the main causes of the highest percentage of vertical transmission of ethnomedicinal knowledge in the study area.

#### 4.2 Ethnoveterinary Medicinal Plant Resource and Knowledge Richness

Recorded 232 EVMPs extend the previously documented EVMPs list to 315 in the state of West Bengal, which indicates the richness of ethnoveterinary medicinal plants and its associated traditional veterinary knowledge among the local people in the studied area (Jain and Dey, 1966; Pal, 1980; Pal, 1981; Mukherjee and Namahata, 1988; Pal, 1992; Ghosh, 1999; Ghosh, 2002; Ghosh, 2003; Bandyopadhyay and Mukherjee, 2005; Mitra and Mukherjee, 2007; Ghosh, 2008; Das and Tripathi, 2009; Rahaman et al., 2009; Dey and De, 2010; Pandit, 2010; Saha et al., 2010; Ghosh, 2011; Saha et al., 2014). Besides West Bengal, a
total number of EVMPs has been estimated from the other parts of India. From the state of Gujarat, 265 plant species of veterinary importance were documented a few years back (Katewa et al., 2010). A total of 294 EVMPs have been reported from the states of North-East India (Sharma, 2012). In a recent review, about 449 EVMPs have been reported from the Indo-Gangetic region (Sikarwar, 2017). It is interesting to mention that, among the total number of veterinary plant taxa recorded from the Indo-Gangetic part of India, 129 EVMPs were common in the present study.

In many ethnobotanical studies, the family Fabaceae has been identified as the richest in medicinal flora among the plant families (Leonti et al., 2003; Molas and Lado, 2009). A variety of biologically active phyto-constituents from different biochemical groups, such as tannins, flavonoids, alkaloids, and terpenes, have so far been reported from different medicinal species of this family, which largely influence their effective use in global folk medicine (Leonti et al., 2002). In the present study, the medicinal use of the highest number of leguminous species also conforms to the diversified therapeutic potentialities of this plant family Fabaceae.

Among the recorded plant taxa, most species are of herbaceous type (43%). The use of the herbs in the highest number in remedy preparation is their abundant growth and easy availability in the locality. It is a fact that humans would prefer to search for food and medicinal plants, which are most abundant, easy to access, and available all around the year (Albuquerque et al., 2005). For these reasons, herbaceous plants have occupied a considerable percentage among the medicinal plants used in almost all the traditional systems of medicine including ethnomedicine in the world (Disler et al., 2014; Eshetu et al., 2015; Parthiban et al., 2016).

Folk medicinal practices are based mainly on wild-growing plants, and this tradition of using local wild plants is still enduring in most ethnic cultures. The present investigation has also witnessed that most of the EVM species (86.15% of the total recorded species) were collected from wild sources, confirming the local people’s dependence on mostly the plants growing in the wild.

Herein, the recorded main plant parts used for remedy preparation are the underground parts. Most of the ethnobotanical explorations carried out in different parts of the world exhibited that roots and underground parts of the plants are used as medicine in the highest or considerable percentage (Mall, 2009; Agrawal, 2013). Roots and other underground parts have been identified as the major sites where many of the bioactive compounds are synthesized and accumulated, further highlighting the scientific basis of these folk herbal practices of using underground parts of the plants (Flores and Flores, 1997; Bais et al., 2001). Most of the time, it has been informed that the collection of underground parts destroys the plant. Such an unsustainable collection practice resulted in the reduction or depletion of the local phytodiversity (Kimondo et al., 2015). Therefore, excessive collection of underground plant parts can cause a threatful impact on local biodiversity.

The present study witnessed the use of a significant percentage (36% of total remedies recorded) of polyherbal recipes. It is justified
| EVM plants | FC (frequency of citation) | UR (number of use reports) | NU (number of uses) | Score of CV index | Ranking |
|------------|---------------------------|-----------------------------|---------------------|-------------------|---------|
| Curcuma longa L. | 44 | 24 | 13 | 0.013786 | 1 |
| Achyranthes aspera L. | 53 | 23 | 7 | 0.011344 | 2 |
| Abrus precatorius L. | 40 | 19 | 4 | 0.009699 | 3 |
| Amarantus spinosus L. | 25 | 17 | 5 | 0.009652 | 4 |
| Azadirachta indica A.Juss. | 20 | 16 | 5 | 0.004598 | 5 |
| Cissus quadrangularis L. | 24 | 21 | 3 | 0.004340 | 6 |
| Pueraria tuberosa (Willd.) DC. | 27 | 17 | 4 | 0.003966 | 7 |
| Andrographis paniculata (Burm.f.) Nees | 22 | 13 | 4 | 0.002523 | 8 |
| Vachellia nilotica subsp. indica (Benth.) Kyal. & Boatw. | 19 | 15 | 3 | 0.002445 | 9 |
| Aristolochia indica L. | 20 | 18 | 2 | 0.001693 | 10 |
| Scoparia dulcis L. | 16 | 11 | 5 | 0.001479 | 11 |
| Curcuma longa L. | 44 | 24 | 13 | 0.013786 | 12 |
| Achyranthes aspera L. | 53 | 23 | 7 | 0.011344 | 13 |
| Abrus precatorius L. | 40 | 19 | 4 | 0.009699 | 14 |
| Amarantus spinosus L. | 25 | 17 | 5 | 0.009652 | 15 |
| Azadirachta indica A.Juss. | 20 | 16 | 5 | 0.004598 | 16 |
| Cissus quadrangularis L. | 24 | 21 | 3 | 0.004340 | 17 |
| Pueraria tuberosa (Willd.) DC. | 27 | 17 | 4 | 0.003966 | 18 |
| Andrographis paniculata (Burm.f.) Nees | 22 | 13 | 4 | 0.002523 | 19 |
| Vachellia nilotica subsp. indica (Benth.) Kyal. & Boatw. | 19 | 15 | 3 | 0.002445 | 20 |
| Aristolochia indica L. | 20 | 18 | 2 | 0.001693 | 21 |
| Scoparia dulcis L. | 16 | 11 | 5 | 0.001479 | 22 |
| Curcuma longa L. | 44 | 24 | 13 | 0.013786 | 23 |
| Achyranthes aspera L. | 53 | 23 | 7 | 0.011344 | 24 |
| Abrus precatorius L. | 40 | 19 | 4 | 0.009699 | 25 |
| Amarantus spinosus L. | 25 | 17 | 5 | 0.009652 | 26 |
| Azadirachta indica A.Juss. | 20 | 16 | 5 | 0.004598 | 27 |
| Cissus quadrangularis L. | 24 | 21 | 3 | 0.004340 | 28 |
| Pueraria tuberosa (Willd.) DC. | 27 | 17 | 4 | 0.003966 | 29 |
| Andrographis paniculata (Burm.f.) Nees | 22 | 13 | 4 | 0.002523 | 30 |
| Vachellia nilotica subsp. indica (Benth.) Kyal. & Boatw. | 19 | 15 | 3 | 0.002445 | 31 |
| Aristolochia indica L. | 20 | 18 | 2 | 0.001693 | 32 |
| Scoparia dulcis L. | 16 | 11 | 5 | 0.001479 | 33 |
| Curcuma longa L. | 44 | 24 | 13 | 0.013786 | 34 |
| Achyranthes aspera L. | 53 | 23 | 7 | 0.011344 | 35 |
| Abrus precatorius L. | 40 | 19 | 4 | 0.009699 | 36 |
| Amarantus spinosus L. | 25 | 17 | 5 | 0.009652 | 37 |
| Azadirachta indica A.Juss. | 20 | 16 | 5 | 0.004598 | 38 |
| Cissus quadrangularis L. | 24 | 21 | 3 | 0.004340 | 39 |
| Pueraria tuberosa (Willd.) DC. | 27 | 17 | 4 | 0.003966 | 40 |
| Andrographis paniculata (Burm.f.) Nees | 22 | 13 | 4 | 0.002523 | 41 |
| Vachellia nilotica subsp. indica (Benth.) Kyal. & Boatw. | 19 | 15 | 3 | 0.002445 | 42 |
| Aristolochia indica L. | 20 | 18 | 2 | 0.001693 | 43 |
| Scoparia dulcis L. | 16 | 11 | 5 | 0.001479 | 44 |
| Curcuma longa L. | 44 | 24 | 13 | 0.013786 | 45 |
| Achyranthes aspera L. | 53 | 23 | 7 | 0.011344 | 46 |
| Abrus precatorius L. | 40 | 19 | 4 | 0.009699 | 47 |
| Amarantus spinosus L. | 25 | 17 | 5 | 0.009652 | 48 |
| Azadirachta indica A.Juss. | 20 | 16 | 5 | 0.004598 | 49 |
| Cissus quadrangularis L. | 24 | 21 | 3 | 0.004340 | 50 |
| Pueraria tuberosa (Willd.) DC. | 27 | 17 | 4 | 0.003966 | 51 |
| Andrographis paniculata (Burm.f.) Nees | 22 | 13 | 4 | 0.002523 | 52 |
| Vachellia nilotica subsp. indica (Benth.) Kyal. & Boatw. | 19 | 15 | 3 | 0.002445 | 53 |
| Aristolochia indica L. | 20 | 18 | 2 | 0.001693 | 54 |
| Scoparia dulcis L. | 16 | 11 | 5 | 0.001479 | 55 |
| Curcuma longa L. | 44 | 24 | 13 | 0.013786 | 56 |
| Achyranthes aspera L. | 53 | 23 | 7 | 0.011344 | 57 |
| Abrus precatorius L. | 40 | 19 | 4 | 0.009699 | 58 |
| Amarantus spinosus L. | 25 | 17 | 5 | 0.009652 | 59 |
| Azadirachta indica A.Juss. | 20 | 16 | 5 | 0.004598 | 60 |
| Cissus quadrangularis L. | 24 | 21 | 3 | 0.004340 | 61 |

(Continued on following page)
because active principles present in different herbal ingredients of a polyherbal recipe exert better therapeutic thrust through their synergistic effect (Amodu et al., 2013; Malik et al., 2017). Therefore, the uses of such polyherbal remedies involving diversified medicinal plants for cattle health indicate the depth and width of the knowledge regarding traditional healthcare for the veterinary animals in the area.

In case of external or topical application, the paste is mainly used as poultice because it is comparatively convenient to apply to the exterior of the affected body part of the veterinary animals. Besides, it is effortless to administer the paste with the animals’ feed orally. It has been noticed that the administration of paste for the treatment of various health disorders of both humans and livestock is a common practice in traditional medicines throughout the world (Giday et al., 2010; Vijayakumar et al., 2016). The probable cause for applying paste in a higher percentage is that paste is prepared easily within a short time by a simple method using convenient and small tools. Like the present study, most of the cases of oral administrations of folk preparation have been encountered in several earlier studies (Jorim et al., 2012; Aziz et al., 2018). Side by side topical application of folk remedies remains an important mode of drug administration to treat diseases, such as skin disorders, wounds, rheumatic pain, and body pain (Sargin et al., 2013; Tariq et al., 2016). Specifically, topical use of poultice increases blood circulation in the affected portions of the body. It also protects the infected wounds or sores from microbial infection again by providing a protective cover to the affected parts in the form of a medicated layer of drug substances. Moreover, many healing substances of the medicinal herbs present in a poultice (such as antiseptic essential oils, phenolics, and tannins) infiltrate through animal tissues, helping it fight against infection and reduce inflammation. Finally, healing of the wound is promoted.

4.3 Magico-Religious Healing

Superstition and magico-religious belief are very much integrated with the life, culture, and health of the ethnic people worldwide (Ahirwar, 2015; Pangging et al., 2018). Like other tribal or ethnic communities, indigenous people of the present study area have a strong faith in magico-religious practices performed to cure and diagnose certain diseases of their domesticated animals. They believe that certain diseases in veterinary animals are caused by the bad influences of evil spirits or some supernatural powers. They treat those sick animals by holy chanting, performing...
special rituals, and offering prayers and sacrifices to appease the suspected evil power by which, according to their belief, certain disease conditions are developed.

4.4 New Uses

After thoroughly checking the relevant books and research articles on ethnoveterinary medicine published from India, 68 EVMPs are found new in several aspects of the existing inventory of Indian ethnoveterinary medicine (Table 1 and Supplementary Table S4). The ethnoveterinary uses of 24 plant species documented in this investigation are exclusively new for India as they have not been reported in the standard literature consulted (Pal and Jain, 1998; Jain, 1999; Ghosh, 2003; Rahaman et al., 2009; Katewa et al., 2010; Jain, 2012; Kumar et al., 2012; Saha et al., 2014; Jain and Jain, 2016; Sikarwar, 2017). The 24 EVM plants identified as new for their uses are Abutilon hirtum (Lam.) Sweet, Aerva javanica (Burm.f.) Juss. ex Schult., Albizia procera (Roxb.) Benth., Coleus strobilifer (Roxb.) A.J.Paton, Cajanus goensis Dalzell, Breyzia vitis-idea (Burm.f.) C.C.Fisch., Caladium bicolor (Aiton) Vent., Centipeda minima (L.) A.Braun & Asch., Cotula rheinmohides Lour., Croton persimilis Mull.Arg., Euphorbia explanata Lind., Hydrolea zeylanica (Vahl) Vahl, Ipomoea carica (L.) Sweet, Ipomoea obscura (L.) Ker Gawl., Jatropha nana Dalzell & A.Gibson, Phoenix acaulis Roxb., Phyllodium pulchellum (L.) Desv., Piper cubeba L.f., Rotheca serrata (L.) Steane & Mabb., Seseli diffusum (Roxb. ex Sm.) Santapau & Wagh, Tacca leontopetaloides (L.) Kunz, Utraria lagopoides (L.) DC., Zingiber zerumbet (L.) Roscoe ex Sm., and Ludwigia adscendens (L.) H.Hara.

It has been noticed that 31 recorded taxa reported earlier as EVMPs are found new in respect of the diseases cured by them. The plant Alangium salviifolium (L.) Wangerin was reported earlier for the treatment of cattle suffering from cough, liver trouble, and poisonous bite (Jain, 1999; Galav et al., 2013), but the same plant was recorded here for the use in curing general weakness.

Five investigated taxa of the present work differ in respect of remedy preparation modes with the earlier reports made by different workers, although those plants are used for curing similar types of diseases such as fever, wound, mastitis, arthritis, and dysentery. For example, leaf of Nicotiana rustica L. is solely used as a germicide to heal cattle wounds (Jain, 1999). However, the leaf of it is administered here topically as paste along with mustard oil and “Sankhachurna” (a rich source of calcium carbonate) for the same purpose. Again, four EVMPs have been found new regarding their parts used. For example, leaves of Abutilon indicum (L.) Sweet have been reported earlier for eye problems (Jain, 1999), but here, for the same purpose, using the root of the same plant is exclusively a new report. Apart from the new uses of angiospermic taxa, ethnoveterinary medicinal uses of Pteridophytes such as Adiantum philippense subsp. philippense is reported first time here as EVMPs from India. On the contrary, the use of Lygodium flexuosum (L.) Sw. root is very much new in respect of treating livestock diseases such as fever of goat (Jain, 1999; Katewa et al., 2010; Jain, 2012; Sikarwar, 2017).

Three fungal species such as Amanita vaginata var. alba Gillet, Lycoperdon perlatum Pers., and Termitomyces heimi have been recorded as ethnoveterinary medicine used by the local traditional healers in the northern laterite region of West Bengal. Among these three fungal species, medicinal uses of Amanita vaginata var. alba Gillet and Termitomyces heimi Natarajan for curing veterinary diseases are exclusively the new addition to the existing database on ethnoveterinary medicine of India (Jain, 1999; Katewa et al., 2010; Jain, 2012; Jain and Jain, 2016).

The present study contributes 68 new medicinal claims, which is substantial and certainly enriches the existing inventories on ethnoveterinary medicine of India. Thus, the present investigation unveils the knowledge diversity of veterinary medicine in the study area and gives a clear indication regarding further studies exploring more novel information from the area after interacting with the traditional specialist healers of livestock diseases. All the new claims of EVMPs recorded here should scientifically be validated to develop bioactive compounds, and effective veterinary drugs have to be standardized after their toxicity assessment.

4.5 Informant Consensus and Cultural Value of Ethnoveterinary Medicinal Plants

Fic value (above 0.7) suggest a high consensus among the participants regarding the uses of large numbers of EVMPs in disease categories such as gastrointestinal disorders, poisonous effect, enteric diseases, fever, and related problems. All these livestock health problems are prevalent in the studied area, and local peoples’ understanding and perception of these health issues make them experts in disease diagnosis and prescribing effective folk remedies.

Fic is assigned to measure the consensus of participants regarding plant uses in a particular disease category, whereas the determination of the fidelity level (FL) helps to identify the most effective plant species cited for that particular disease category. Though sometimes, the FL value misleads in data interpretation when attaining a maximum score with few citations for one or two purposes. On the contrary, a species with multiple uses may show a lower FL value with more citations for a particular purpose. Therefore, it does not indicate that a plant with a higher fidelity percentage may have a maximal citation number. For this reason, in the present study, along with the FL value, the number of use mentions for a plant species made by all participants has been considered to recognize the most reliable species used in a disease category (Andrade-Cetto and Heinrich, 2011). A total of 23 species have been identified here as the most important medicinal plants whose FL value and citation number are higher than the other recorded plant species.

Among the frequently cited 68 EVM plant species, nine plants have been identified as the most valuable ones in the culture of the studied area, which indicate that the knowledge about uses of those nine plants is well distributed among the people of the area because of their higher frequency of citations as well as multipurpose uses, which are the basic components of the CV index.

The resulting value of the CV index is extracted from the cumulative effort of all the factors such as total number of use reports, total number of use categories, citation frequency, and the total number of participants interviewed. Therefore, the use of
the CV index for assessing the cultural importance of a species is much more accurate than the individual application of indices such as UV, FL, or RFC, which are not independent of each other and function more or less similarly (Dudney et al., 2015). Thus, the scientific community should consider the CV index as an effective tool for assessing the overall cultural value of a species.

4.6 Conservation Facets
Quantitative analysis of ethnobotanical data not only helps identify the most important plant species but also provides information about those most frequently exploited plant species in a particular area, which will help frame a strategy for the conservation of those exploited plants. Among the important plants, some species that have been cited in a very high frequency are naturally facing a high collection pressure because of their use in more significant amounts than the other important species with lower citation frequency. Such species with the high use demand identified here are Andrographis paniculata (Burm.f.) Nees, Aristolochia indica L., Soymida febrifuga (Roxb.) A. Juss., Madhuca longifolia (J. Koenig ex L.) J.F.Macbr., Asparagus racemosus Willd., Smilax ovalifolia Roxb. ex D.Don, Semecarpus anacardium L.F., Casearia tomentosa Roxb., Barleria prionitis L., and Acacia catechu (L.f.) Willd. It is assumed that these species might face certain degrees of population decline shortly due to their excessive collection from the wild. Many other factors, such as unsustainable harvest of the bark (ring barking), underground part (uprooting of the whole plant), seed or fruit (indiscriminate collection), and habitat destruction, are also found responsible for the population decline of those most exploited plant species in the area. This fact has already been reflected in some ethnobotanical studies carried out in different forest areas of the northern laterite region of West Bengal, where very low populations of many of those above-mentioned plants were encountered (Joshi, 2012; Bauri et al., 2013; Bhattacharya and Mukherjee, 2013; Bouri et al., 2014; Pradhan and Rahaman, 2015; Ganguli et al., 2016). All those plants frequently used in the study area should get priority for their immediate conservation. In doing this, a separate research program has to be undertaken to identify the most prioritized species in the northern laterite part of West Bengal employing the well-devised dedicated statistical index like conservation priority index (CPI) or local conservation priority index (LCPI) (Oliveira et al., 2007; Lucena et al., 2013). In the present investigation, only the indication has been made here are nine most valuable EVMPs should be prioritized for their immediate conservation. In doing this, a separate research program has to be undertaken to identify the most prioritized species in the northern laterite part of West Bengal employing the well-devised dedicated statistical index like conservation priority index (CPI) or local conservation priority index (LCPI) (Oliveira et al., 2007; Lucena et al., 2013). In the present investigation, only the indication has been made for evaluating their phytochemical and pharmacological properties. In many cases, pharmacological evidence of the earlier works validates the ethnomedicinal claims associated with those culturally important plants. Amaranthus spinosus L. is prescribed for treatment of delay in parturition, body ache, fever, hemorrhagic septicemia, and retention of milk and validated by earlier pharmacological studies for its antispasmodic (Chaudhary et al., 2012), antimicrobial (Sheeba et al., 2013), antioxidant, and anti-inflammatory (Kumar B. S. A. et al., 2010) properties. This plant has not yet been examined for its galactagogue activity, which needs a thorough investigation to justify its traditional use as an enhancer of milk secretion in cows.

Pharmacological investigations on the anti-osteoporotic and anti-inflammatory activities of Cissus quadrangularis L. substantiate the scientific basis of using this plant to treat fractures and swelling. Nevertheless, no scientific validation has been made for its anthelmintic property recorded in the present investigation.

The uses of Wattakaka volubilis (L.f.) Stapf. in liver trouble and unusual urination of the cattle recorded here need detailed phytochemical and pharmacological studies for its validation of hepatoprotective and diuretic properties as this medicinal plant has not been screened in such directions before (Natarajan and Dhas, 2013; Chaudhuri and Chakraborty, 2017).

In case of Pueraria tuberosa (Willd.) DC., the tuber of it is used by the local people to treat helminthiasis and poor lactation. Many biological activities of Pueraria tuber have already been examined by different groups of scientists from various parts of the world, but no pharmacological investigations are made on its veterinary anthelmintic property (Hinsch et al., 2000; Saha et al., 2012; Chauhan et al., 2013).

Therefore, from this discussion, it is understood that these nine plants are culturally important and provide some important clues, enabling the scientists to undertake a scientific investigation for evaluating their phytochemical and pharmacological profiles.

4.8 Scientific Justification of Using Preferred Additional Ingredients
Preference ranking exercise of the additional ingredients used in polyherbal preparations revealed that ingredients such as fruits of Piper nigrum L. and Piper longum L., rhizomes of Curcuma longa L. and Zingiber officinale Roscoe, and seeds of Nigella sativa L. are the most popular among the participants of the studied area. There is a long tradition of using peppers (both black and long peppers) and ginger in many folk remedies. Scientific attempts have been made to justify the reason for using these herbal ingredients in traditional medicine. Through experiments, it has been established that the fruits of Piper nigrum L. and Piper longum L. contain piperine alkaloid, which increases the bioavailability of active principles present in a drug preparation (Patil et al., 2011). Scientists have suggested two possible mechanisms in this regard. Piperine may promote rapid absorption of drugs and nutrients through the intestine, and it also inhibits the activities of enzymes involved in the enzymatic breakdown of drugs (Ajazuddin et al., 2014). In the present investigation, Piper longum L. is used as an additional ingredient of a polyherbal formulation prepared with Zingiber...
which helps enhance the effectiveness of the folk preparations. Different combinations of herbal ingredients in a traditional recipe, polyherbal recipes as additional ingredients indicate that folk (Adhatoda vasica Nees) is increased when long pepper is added to it (Randhawa et al., 2011). Likewise, the traditional use of Curcuma longa L. in ethnomedicine has scientifically been justified through several studies where curcumin, its bioactive compound, has been established as a potent natural bioenhancer (Zhang et al., 2007; Pavithra et al., 2009; Yan et al., 2010). Besides its wide range of pharmacological efficacy, ginger (Zingiber officinale Roscoe) acts as an effective bioenhancer in promoting absorption of active phyto-constituents of the drug through the intestine (Qazi et al., 2003). Luteolin present in Cuminum cyminum L. exhibits its bioenhancing activity by inhibiting the activity of permeability glycoprotein (P-gp) present in the intestinal epithelium (Boumendjel et al., 2002). In a recent finding, it has been observed that active constituents of Nigella sativa L. interact with the co-administered drugs and enhance intestinal availability of the compounds present in the drugs (Ali et al., 2012). Therefore, the uses of all those herbal ingredients in polyherbal recipes as additional ingredients indicate that folk healers of the studied area have more excellent knowledge about different combinations of herbal ingredients in a traditional recipe, which helps enhance the effectiveness of the folk preparations.

4.9 Local Peoples’ Perception of Ethnoveterinary Medicinal Knowledge System and Its Resilience

EVM system is as old as the history of animal domestication, which is continuously being shaped and reshaped by trials and errors of using local biodiversity to maintain resilience. The resilience of the local EVM knowledge system depends on the utilization pattern of phytoresources and the knowledge transmission character (Santoro et al., 2015).

The present study witnessed some of the features of local EVM knowledge system which can play a crucial role in maintaining resilience such as men are much knowledgeable in practicing and applying EVM, most knowledgeable aged participants still possess substantial information of this therapeutic system, apart from the traditional expert practitioners of livestock diseases, a large number of participants have adequate EVM knowledge, and vertical transmission of knowledge is predominant. Local people of the laterite region of West Bengal depend mainly on cultivation and livestock rearing for their livelihood and by any sort of default the livestock population may decrease which creates a great bearing on their economy. For this reason people in the study area have been concerned to their livestock health care since ancient time and have been developed a well organized system of veterinary animal health care through regular incorporation of more and more newly innovated healing options for so many ailments and diseases. A good number of EVM species have been used for single purpose (for example, 46 species of plants are used for gastrointestinal problems of livestock) which is a good indicator of resilience of knowledge in the studied area because EVM system here does have a wide range of options for treatment of a particular disease, without being hampered due to unavailability of one or few drug plant resources.

5 CONCLUSION

The present study embodies a quite large extent of documented knowledge about 306 folk veterinary remedies which are worthy for its inclusion in the inventories on folk veterinary medicine and ethnomedicinal resources of the state and national level (Figure 7).

The uses of 68 EVMPs are new to the existing Indian ethnoveterinary pharmacopeia, which highlights the knowledge diversity and unknown knowledge on veterinary medicine in the surveyed area. Such new information create a golden opportunity in the field of bioprospecting research by providing the ethno-guided clues to the scientists for scientific validation, standardization, and safety evaluation of those plant species before their recommendation as ethnoveterinary medicine (EVM). Moreover, nine EVMPs have been identified as the most important species, which can also be considered statistically justified good candidates for their ethno-guided bioprospection in the future. The collaborative efforts of traditional and modern knowledge are needed here to develop new efficacious drugs for livestock diseases with minimum or zero side effects.

The present investigation highlights some basic concern about conservation status and collection pressure of those important ethno-species used most frequently in the area. To prioritize the most exploited species for conservation in the area, along with collection pressure faced by each species, other factors like, degree of access and population dynamics of each of the important species are to be considered.

The strength of the EVM system identified in the region is its knowledge diversity (recorded remedies 306) and diversity of associated drug resources including phytoresources (plant species recorded 232). The system is practiced among the local people in the area very actively with a good number of optional drug species assigned to the healing purposes of many common diseases. These characteristics of the EV knowledge articulate its vitality and also the flexibility of its many of the knowledge spheres. Knowledge transmission is operated here predominantly through vertical route that is also an indication of resilience of the EVM system. Besides, the greater part of this vast knowledge trove is confined to the aged people domain, not to the younger generation in the society of this area. This is a very alarming concern identified in the context of sustainability of EVM knowledge system in the northern laterite region of West Bengal, India.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material. Further inquiries can be directed to the corresponding authors.
ETHICS STATEMENT

There are no strict codes or rules to conduct ethnobotanical research in India. The purpose and outcome of the present study have been explained in detail to the participants before their active engagement in the study. Participation of each participant was voluntary. For ethnobotanical data collection, Prior Informed Consent (PIC) was taken from each of the participants before interviewing them, following the decorum of Article 8(1) of the Convention on Biological Diversity (CBD). Written informed consent was obtained from the individual(s) and minor(s)/ legal guardian/next of kin for the publication of any potentially identifiable images or data included in this article. Resulted data will be included online at Shodhganga (https://shodhganga.inflibnet.ac.in/), a digital repository of research content maintained by University Grant Commission, India.

AUTHOR CONTRIBUTIONS

SKM and CHR designed the work. SKM conducted the field survey, collected ethnomedical data, and analyzed the data. SKM and CHR wrote the manuscript, checked critically, and finalized the draft.

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