Ethnoveterinary Medicines: A Potential Alternative to Animal Health Care for the Tribal Communities of Koraput, Odisha

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Abstract. Medicinal plants play an important role throughout the world for the treatment and prevention of various diseases of both human and animal. The tribal communities of Koraput still depend on medicinal plants for their first aid remedies to treat some simple ailments of livestock. The present study was initiated to quantitatively document their indigenous knowledge on the utilization of most common medicinal plants for livestock treatment. A total of 40 field surveys were carried out from August 2015 to October 2016 in order to document the utilization of medicinal plants. The ethnoveterinary information was collected through structured interviews among the traditional healers and local livestock farmers. The collected data were analyzed through use value (UV), informant consensus factor (Fic) and fidelity level (FL). A total of 56 species of plants distributed in 54 genera belonging to 36 families were identified as commonly used medicinal plants by the tribal communities of Koraput for the treatment of 20 types of ailments. These ailments were categorized into 9 ailment categories based on the body systems treated. Leaves were the most frequently used plant parts and most of the medicines were prepared in the form of paste and administered orally. Fic values of the present study indicated that there was a high agreement in the use of plants in the treatment of wound infections, dysentery and eye problems among the users. Dermatological infections/diseases and gastro-intestinal disorders had highest use-reports and 2 species of plants had the highest fidelity level of 100%. The most important species according to their use value were Curcuma longa, Ficus religiosa, Aloe vera, Ziziphus mauritiana, Tridax procumbens and Vitex negundo. As a result of the present study it can be recommend the plants Aloe vera, Azadirachta indica, Calotropis procera, Curcuma longa, Datura metel, Ficus religiosa, Ziziphus mauritiana, Vitex negundo and Tridax procumbens can be investigated further for their ethnopharmacological properties for the discovery of potential new drugs for veterinary treatment.

Introduction

Traditional medicine is a part of the indigenous knowledge system of the people all over the world. According to the World Health Organization (WHO), at least 80% of the people in developing countries depend on indigenous practices for treatment of various diseases of both human being and their animals [1]. The medicinal plants are also used extensively and quite effectively for primary health care treatment of the domestic animals [31]. The indigenous knowledge of the veterinary health care system acquired by traditional herbal healers and the information passes from one generation to other. Even though the rate of medicinal plant utility is ever increasing, very little is known about its use patterns. It is very important to document, analyze and evaluate this knowledge for their commercial value, as the medicinal plants is one of the most successful criteria used by the pharmaceutical industry in finding new therapeutic agents [2]. This growing interest in traditional practices had been encouraged by the recognition of some efficient ethnoveterinary medicinal products.
In recent years, increasing attention has been paid to ethno-veterinary knowledge and local veterinary practices. There is a growing acceptance in the field of ethnoveterinary research and development in many parts of the developing countries [17, 28, 15, 32, 14]. Some studies on ethnoveterinary practices has also been reported by many researchers from different regions of India [6, 13, 5, 21, 12, 31]. But the traditional knowledge is rapidly degrading due to modernization and gradually, these practices are hardly documented and largely lost, diluted and distorted. Therefore, the traditional knowledge of animal healthcare practices requires great attention for pharmaceutical analysis to prospect new drugs in the concerned field.

Odisha is a genetic paradise of natural resources especially Koraput is one of the tribal dominated district of south Odisha, rich in different plant resources and centres of diversity for many forest species [18] and also well known for its rich human cultural diversity [19]. There is no such report on ethnoveterinary practice of medicinal plants used by the tribal communities of Koraput. In view of this, the present study was conducted to quantitatively document the ethnoveterinary medicinal plants and their utilization for primary health care treatments of animals by the tribals of Korapur district. This study provided an inventory of medicinal plants used in ethnoveterinary practices against different diseases and can act as a low cost option than the western drugs.

Materials and Methods

Study area and tribal community

Koraput is the Southernmost district of Odisha lies between 18° 14’ to 19° 14’ N latitude and 82° 05’ to 83° 25’ E longitude with a total geographical area of 8,807 sq km (5.38% of Odisha state) (Fig. 1) Physio-graphically it is contiguous to the main land of Eastern Ghats, High land zone and South-Eastern Ghats zone. The general topography is of broken mountains interrupted by large riverbeds and water courses. Fifty two tribal communities constituting 50.56% of its population live in the district as per the census details of 2011 [18]. The study was conducted in 60 different tribal villages of Koraput district which are inhabited by different tribal communities in the deep forest areas. A total of 40 field surveys were carried out from August 2015 to October 2016 in order to document the utilization of medicinal plants. The indigenous people of the study area are Paraja, Bhumia and Bhatra, the oldest tribal group of the branch of ethnic group in Odisha. They live predominantly in the villages mainly closer to the deepest forest. Most of the tribal have a general knowledge of medicinal plants that are used for first aid remedies, to treat the simple ailments of their animals.
Data collection

Information on ethno-veterinary medicinal plants was collected from different respondents of diversified age groups of different tribal communities of Koraput. A total of sixty four informants with traditional healers were identified to get the ethnoveterinary information by structured questionnaires through direct interviews/oral conversations. They have sound knowledge on medicinal plants found in their surrounding areas and they practice medicine within their families and neighbors. Information on local name of plant, plant part used for curing, method of preparation, any other plants/agents used as ingredients, modes of administration and etc. were recorded. The plants were collected and identified by following the flora of Orissa by Saxena and Brahmam [27] and Botany of Bihar [9].

Ailment categories

Based on the information obtained from the traditional healers in the study area, all the reported ailments were categorized into nine categories such as gastro-intestinal ailments (GIA), dermatological infections/diseases (DID), respiratory systems diseases (RSD), genito-urinary ailments (GUD), fever (FVR), skeleto-muscular system disorders (SMSD), poisonous bites (PB), eye problems (ED) and helminthes diseases (HD). Several diseases were placed in one ailment category based on the body systems treated.

Informant Consensus Factor (Fic)

The informant consensus factor (Fic) was used to determine the acceptance of the plants in the ailment categories by the users of the study area. The Fic was calculated by using the following formula [11].

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

where Nur refers to the number of use-reports for a particular ailment category and Nt refers to the number of species used for a particular ailment category by all informants.

Use Value (UV)

The relative importance of each plant species used to treat various diseases known locally to be is reported as use value (UV) and it was calculated using the following formula [20].

![Map showing the origin study area from Koraput, Odisha.](https://example.com/map.png)
UV = ΣU/n ,
where UV is the use value of a species, U is the number of use reports cited by each informant for a given plant species and n is the total number of informants interviewed for a given plant.

**Fidelity Level (FL)**

The fidelity level (FL) determines the most frequently used plant species for treating a particular ailment category by the informants. The FL was calculated using the following formula [4].

\[ FL(\%) = \frac{N_p}{N} \times 100 , \]

where \(N_p\) is the number of use-reports cited for a given species for a particular ailment category and \(N\) is the total number of use reports cited for any given species.

**Result and Discussion**

**Documentation of indigenous ethnoveterinary knowledge**

A total of 56 species of plants distributed in 54 genera belonging to 36 families which were commonly used for the treatment of 20 different ailments by the tribal healers of Koraput. The plant species under the family of Euphorbiaceae was prominent having four species, followed by Caesalpiniaceae, Fabaceae, Lamiaceae, Liliaceae, Mimosaceae and Poaceae with three species each. The scientific name of the plant, family, local name, life form, use value, parts used, ailments treated with method of preparation and mode of application were presented in Table 1 in Appendix.

The information on the medicinal values of the plants documented in our study area were compared with the earlier information reported by the researchers from other parts of India. No such plants were reported as a new medicinal plants as all the plants were reported with different uses by other researchers of India [31, 6, 13].

**Life form and parts used for the preparation of ethnoveterinary medicine**

The present study revealed that the plants under trees categories were the primary source of medicine (38%) followed by herb (34%), shrubs (23%) and creeper (5%) (Fig. 2). Leaves (51%) were most frequently used for the preparation of medicine or mixed with other plant parts among the other plant parts used, followed by whole plant (20%) fruit (10%), stem bark (10%), stem (4%), root (4%), latex (3%), root and seed (1% each) (Fig. 3). This result is consistent with the previously reported study by the researchers of the country where they also reported the use of plant leaves for the preparation of herbal medicines by many indigenous communities [31, 5, 6, 13, 22, 10, 24, 26]. The Leaves can be easily collected than the other parts of the plant and they are active in photosynthesis and production of secondary metabolites which may be the reason to use the leaves for herbal medicine preparation [7, 8].

![Figure 2. Life forms of reported medicinal plants.](image-url)
Mode of administration of plants and method of preparation

The use and preparation of medicinal plant parts were grouped into four categories (Fig. 4). Most commonly used method of preparation for the herbal medicine was paste (51%) followed by used as feed stuff (28%), juice (13%) and decoction (8%). Preparation of paste for the treatment of different ailments is a common practice in human and animal healthcare system among the tribals in India [1, 16]. The fresh leave or bark paste was prepared with oil or water and the decoction was prepared by boiling the plant parts in water until the volume was reduced to required amount. In the present study most of the tribal healers suggested that internal uses (74%) of the herbal preparation were predominant over external or topical uses (26%). The plant paste or medicated oil were used topical and directly applied on the affected area for the treatment of diseases like skin disorders, wounds, poison bites, dysentery and stomach worm.

Figure 3. Percentage of plant parts used for the preparation of medicine.

Figure 4. Categories of mode of utilization for the preparation of medicine.

Plant use values

The most commonly used species was Curcuma longa with 109 use-reports by 64 informants, giving the highest use value of 1.76. Curcuma longa is use in the treatment of various diseases in all animals and it is well known as traditional spice of India with antiseptic properties. Other important plants with high use value were Ficus religiosa (85 use reports by 64 informants with a UV of 1.33), where as Aloe vera, Ziziphus mauritiana, Tridax procumbens and Vitex negundo (76 use-
reports by 64 informants with a UV of 1.18). The plant with very low use value was *Phoenix acaulis* which is reported by only seven informants with UV of 0.11, but the informant is regularly using this plant in the treatment of stomach worms in case of calf, goat and sheep. The scarce availability of these plants in the study area may be the reason for low use value [25] as in the case of Koraput. Similar to our study, most of the reported plants in the present study are also used by the different types of tribal people in India for the treatment of various diseases in livestock [26, 22].

**Informant consensus factor**

In order to use the informant consensus factor (Fic), we classified the diseases into nine broad ailment categories. The Fic values in the present study are ranged from 0.96 to 1.00. The use categories with more than 400 use-reports were dermatological of infections/diseases (469 use-reports, 15 species), gastro-intestinal diseases (405 use-reports, 12 species) and helminthes infection (245 use-reports, 10 species) (Table 2). In the present study, fever followed by eye disease had the highest Fic of 1.00 and 0.99 respectively. The informant consensus factor (Fic) determines the local knowledge of the people for the treatment of diseases which mainly depends on the availability of the plant species in the study area [23]. The least agreement between the informants was observed in the respiratory system disorder with a Fic of 0.95 (Table 2). Thus the present study indicates that the information on the use of medicinal plants in the livestock treatment shared by the users in the study area is high. Our findings showed that these ailment categories had high number of use-reports among the tribal communities of Koraput with high Fic values.

**Table 2.** Informant consensus factor for commonly used medicinal plants for the treatment of livestock.

| Ailment category                | Number of use-reports (Nur) | Number of taxa (Nt) | Informant consensus factor (Fic) |
|--------------------------------|------------------------------|---------------------|---------------------------------|
| Gastro intestinal ailments     | 405                          | 12                  | 0.97                            |
| Poisonous bite                 | 98                           | 2                   | 0.98                            |
| Dermatological infection/Disease | 469                         | 15                  | 0.97                            |
| Eye disease                    | 201                          | 4                   | 0.99                            |
| Fever                          | 231                          | 8                   | 1.00                            |
| Respiratory system disorder    | 137                          | 5                   | 0.95                            |
| Skeleto muscular system disorders | 80                           | 3                   | 0.97                            |
| Genito urinary diseases        | 221                          | 7                   | 0.97                            |
| Helminthes disease             | 245                          | 10                  | 0.96                            |
| **TOTAL**                      | **2087**                     | **67**              |                                 |

**Fidelity level**

The ailment categories were analyzed in order to highlight the most important plants in each category (Table 3). Among the 56 reported plants, 2 species had highest fidelity level of 100% which were used in treatment of single ailment category with multiple informants. For the analysis of fidelity level, the plants with less than seven use reports were not considered. The plants with highest FL of 100% were *Achyranthus aspera* (ED) and *Ficus religiosa* (GUD). The maximum FL for the above plants indicated the 100% choice of the interviewed informants for treating specific ailments and this could be an indication of their healing potential. *Tridax procumbens, Albizia lebbeck, Mimosa pudica, Ocimum tenuiflorum, Cassia fistula, Boerhavia diffusa, Cordia oblique, Euphobia hirta, Portulaca oleracea, Calotropis procera* and *Leucas aspera* were documented to have above 50% of FL for treatment of various ailment category by the local tribal of Koraput. The fidelity level of the present study was comparable with the study of ethnoveterinary study of the tribal society of Sulaiman range by Tariq et al. [29].
Table 3. Diseases grouped by different ailment categories with fidelity level (FL) values for common medicinal plants used by tribal communities.

| Sl. no | Ailment categories | Medical terms | Most preferred species with specific ailment | Fidelity level (%) |
|--------|--------------------|---------------|---------------------------------------------|-------------------|
| 1.     | Gastro intestinal ailments (GIA) | Diarrhea | Abutilon indicum | 20.00 |
|        |                    | Dysentry     | Aegle marmelos | 20.00 |
|        |                    | Stomach disorder | Bambhusa arundinacea | 15.38 |
|        |                    | Indigestion  | Cynodon doctylon | 25.00 |
|        |                    | Piles/Constipation | Dalbergia sissoo | 15.00 |
|        |                    |              | Mangifera indica | 11.11 |
|        |                    |              | Ricinus communis | 21.11 |
| 2.     | Poisonous bite (PB) | Snake bite | Terminalia arjuna | 38.46 |
|        |                    | Poison consumption | Tamarindus indica | 20.00 |
| 3.     | Dermatological infection/Disease (DID) | Tic problem | Annona reticulata | 30.80 |
|        |                    | Wound        | Cuscuta reflexa | 30.80 |
|        |                    |              | Tridax procumbens | 54.50 |
|        |                    |              | Cassia tora | 21.40 |
| 4.     | Eye disease (ED) | Tearing of eye | Achyranthes aspera | 100.00 |
|        |                    |              | Albizia lebbeck | 56.10 |
| 5.     | Fever (FVR) | Fever | Andrographis paniculata | 42.86 |
|        |                    | Pox           | Mimosa pudica | 66.67 |
|        |                    |              | Pongamia pinnata | 42.86 |
| 6.     | Respiratory system disorder (RSD) | Cough | Ocimum tenuiflorum | 70.00 |
|        |                    | Cold          | Cassia fistula | 58.78 |
| 7.     | Skeleto muscular system disorders (SMSD) | Fracture | Abrus precatorius | 15.00 |
|        |                    | Joint swelling | Azadirachta indica | 21.05 |
| 8.     | Genito urinary diseases (GUD) | Lactation | Asparagus racemosus | 21.00 |
|        |                    | Pregnancy delivery | Ficus religiosa | 100.00 |
|        |                    | Fertility     | Boerhavia diffusa | 81.00 |
|        |                    |              | Cordia obliqua | 75.60 |
|        |                    |              | Euphobia hirta | 74.00 |
|        |                    |              | Portulaca oleracea | 53.43 |
| 9.     | Helminthes disease (HD) | Helminthes infection | Bryophyllum pinnatum | 33.33 |
|        |                    | Worm infection | Calotrops procera | 71.43 |
|        |                    |              | Carica papaya | 50.00 |
|        |                    |              | Leucas aspera | 65.00 |

Reliability of reported uses

The plants which are used in more than one ailment could have biologically active component or pharmacologically active components [30]. The tribals of Koraput used the bark decoction of *Ficus religiosa* for easy delivery of calf and to maintain the pregnancy with a use value of 1.33 and FL of 100%. Most of the plants reported in this study have more use value and Fic which indicate the effectiveness of the plant to treat various ailments in livestock. This indicates that locally available plant populations are a major determinant of the plant species used in ethnoveterinary medicines in the study area. In support of our study, *Ficus religiosa*, *Ziziphus mauritiana* has been reported by other researches for the presence of various metabolites which implies a good ethnoveterinary medicinal plants [17, 31]. The ethnoveterinary studies evident that, the efficiency of these reported plants species should be investigate to proven the drugs used in modern medicines [3].

Conclusion

The traditional folk medicines were still practiced by the tribal communities and only a few individuals in the tribal communities have accurate knowledge on the medicinal application of the plants. Thus, our work would be useful in preventing the loss of ethnoveterinary traditions of the tribal communities. The plants with highest fidelity level and use values in the present study may indicate the possible occurrence of valuable phytochemicals. The efficacy and safety of all the
reported ethnoveterinary plants needs to be evaluated for phytochemical and pharmacological studies to carry out future bioassay and toxicity studies. Among all the reported plant species, *Aloe vera, Azadirachta indica, Calotropis procera, Curcuma longa, Datura metel, Ficus religiosa, Ziziphus mauritiana, Vitex negundo* and *Tridax procumbens* had the high use values which may be use further for ethnopharmacological studies. These ethnoveterinary medicinal plants can be a cheap and readily available alternative source of medicines to costly drugs. Hence a need for detailed investigation of ethnoveterinary knowledge held by each tribal community is required before such valuable knowledge vanishes.

**Appendix**

**Table 1.** List of commonly used medicinal plants used by tribals of South Odisha for the treatment of various diseases of animal. Gastro intestinal ailments (GIA); Poisonous bite (PB); Dermatological infection/Disease (DID); Eye disease (ED); Fever (FVR); Respiratory system disorder (RSD); Skeleto muscular system disorders (SMSD); Genito urinary diseases (GUD); Helminthic disease (HD).

| Sl no | Botanical name | Local name | Family | Live form | Use value | Parts use | Affliant category- no. of use reports (Ailments treated) | Preparation | Application | Affected animal |
|-------|----------------|------------|--------|-----------|-----------|-----------|---------------------------------------------------------|-------------|-------------|----------------|
| 1     | *Abrus precatorius* L. | Gunja | Fabaceae | Creeper | 0.67 | Leaf and seed | SMSD- 43 (muscular swelling) | Paste | Topical | Cow and Buffaloes |
| 2     | *Abutilon indicum* (L.) | Pedipedika | Malvaceae | Shrub | 0.83 | Leaf | GIA- 53 (dysentery) | Paste | Oral | Goat and Sheep, Cow and Buffaloes |
| 3     | *Acacia nilotica* (L.) Delile. | Bamura | Mimosaceae | Tree | 0.50 | Leaf | GIA- 32 (diarrhoea) HD- 13 (stomach worms) DID- 24 (wounds RSD- 13 (cold and cough) | Paste | Oral | Goat and Sheep, Cow and Buffaloes |
| 4     | *Acalypha indica* L. | Indramarcha | Euphorbiaceae | Herb | 0.37 | Leaf | ED- 56 (watering in eyes) FVR- 21 (fever) | Juice | Internal | Cow and Buffaloes |
| 5     | *Achyranthes aspera* L. | Apamaranga | Amaranthaceae | Herb | 0.87 | Leaf | DID- 49 (dysentery and diarrhoea) | Paste | Oral | Goat and Sheep |
| 6     | *Adhatoda vasica* Nees. | Basanga | Acanthaceae | Shrub | 0.32 | Leaf | ED- 49 (eye problem). | Decoction | Oral | Goat and Sheep |
| 7     | *Aegle marmelos* (L.) Correa. | Bela | Rutaceae | Tree | 0.76 | Fruit | ED- 49 (eye problem). | Paste | Oral | Goat and Sheep |
| 8     | *Albizia lebbeck* (L.) Benth. | Sirisa | Mimosaceae | Tree | 0.76 | Leaf | ED- 49 (eye problem). | Juice | Internal | Goat, Cow and Buffalo |
| 9     | *Allium cepa* | Piyaja | Liliaceae | Shrub | 0.16 | Leaf | RSD- 10 (cold, Juice cough) HD- 20 (worm) | Juice | Oral | Goat and Cow |
| 10    | *Aloe vera* (L.) Burm f. | Ghiakuanri | Liliaceae | Herb | 1.18 | Whole plant | ED- 76 (tearing of eye) | Juice | Internal | Cow and Buffalo |
| No. | Species Name                           | Family       | Form | Uses | Part Used | Use Type | Oral Use | Topical Use |
|-----|---------------------------------------|--------------|------|------|-----------|----------|----------|-------------|
| 11  | Andrographis paniculata Nees.         | Acanthaceae  | Herb | Whole plant | FVR- 7 (fever) | Decoction | Oral | Goat |
|     |                                       |              |      |      | RSD- 15 (cough) |          |         |             |
| 12  | Annona reticulata Linn.               | Annonaceae   | Tree | Leaf | DID- 15 (tics and lice) | Paste | Topical | Cow and Buffalo |
|     |                                       |              |      |      | GLA-  27 (constipation) | Whole plant | Oral | Cow and Buffalo |
| 13  | Argemone mexicana L.                  | Papaveraceae | Herb | Whole plant | GIA-  27 (constipation) | Decoction | Oral |             |
| 14  | Asparagus recemosus Willd.            | Liliaceae    | Creeper | Tuber | GUD-  67 (heat production) | Oral |         |             |
| 15  | Azadirachta indica A. Juss.           | Meliaceae    | Tree | Leaf | GIA-  27 (stomachache) | Paste | Or and Topical | Cow and Buffalo |
|     |                                       |              |      |      | SMSD- 15 (fractured horns) | Oral |         | Bird and parrots (heal injury) |
|     |                                       |              |      |      | DID-  7 (injury) |          |         |             |
| 16  | Bambusha arundinacea (L) Schreb       | Poaceae      | Shrub | Leaf | GID-  69 (dysestheny) | Juice | Oral | Cow |
| 17  | Boerhaavia diffusa L.                 | Nyctaginaceae| Herb | Whole plant | GUD-  12 (easy delivery of calf) | Feed stuff | Oral | Cow and Buffaloes |
| 18  | Bryophyllum pinnatum (Lam.) Kurz      | Crassulaceae | Shrub | Leaves | HD- 12 (stomatich worm) | Feed stuff | Oral | Cow |
| 19  | Calotropis procera (Aiton) Dryand.    | Asclepiadaceae| Shrub | Leaves | GUD-  10 (worms) | Feed stuff, Root paste | Oral and Topical (wound) | Cow and Buffaloes |
|     |                                       |              |      |      | GUD-  15 (increase the milk quantity) |         |         |             |
|     |                                       |              |      |      | DID-  24 (wound) |          |         |             |
|     |                                       |              |      |      | FVR-  64 (fever) |          |         |             |
| 20  | Cardiospermum halicacabum Phutuphutika | Sapindaceae  | Shrub | Whole plant | HD-  15 (worms) | Paste | Oral | Goat, Sheep, Garden (wound) |
| 21  | Carica papaya Linn.                   | Cari caceae  | Tree | Fruit | HD-  64 (Worms) | Juice | Oral | Cow and Buffaloes |
|     |                                       |              |      |      |             |          |         |             |
| 22  | Cassia fistula L.                     | Caesalpiniace | Tree | Bark | RSD –  51 (cough) | Paste | Oral | Sheep, Goat and Buffaloes |
| 23  | Cassia tora L.                        | Caesalpiniace | Tree | Leaf and seed | DID-  32 (skin diseases and wound) | Paste | Topical | Sheep and Goat |
|     |                                       |              |      |      | DID-  47 (wound) |          |         | Sheep and Goat |
| 24  | Cassius quadrangularis L.             | Vitaceae     | Herb | Whole plant | GUD- 12 (lactation) | Feed stuff | Oral | Sheep, Goat and Buffaloes |
| 25  | Cordia obliqua Willd.                 | Boraginaceae | Tree | Leaves | GID-  76 ( loose motion) | Paste | Oral | Sheep, Goat and Buffaloes |
|     |                                       |              |      |      | HD-  13 (stomach worms) |          |         | Sheep, Goat and Buffaloes |
|     |                                       |              |      |      | DID-  20 (wound) |          |         | Sheep, Goat and Buffaloes |
|     |                                       |              |      |      | DID-  72 (remove worms in wound) |          |         | Sheep, Goat and Buffaloes |
| 26  | Curcuma longa Linn.                   | Zingiberaceae| Herb | Root | GID-  76 ( loose motion) | Paste | Oral | Sheep, Goat and Buffaloes |
|     |                                       |              |      |      | HD-  13 (stomach worms) |          |         | Sheep, Goat and Buffaloes |
|     |                                       |              |      |      | DID-  20 (wound) |          |         | Sheep, Goat and Buffaloes |
|     |                                       |              |      |      | DID-  72 (remove worms in wound) |          |         | Sheep, Goat and Buffaloes |
| 27  | Cuscuta reflexa Roxb.                 | Convolvulaceae| Creeper | Whole plant | GID- 12 (lactation) | Paste | Topical | Cow and Buffaloes |
|     |                                       |              |      |      |             |          |         |             |
|   | Scientific Name                  | Common Name     | Family       | Part    | Purity | Use                  | Route   | Remarks                          |
|---|---------------------------------|-----------------|--------------|---------|--------|-----------------------|---------|---------------------------------|
|28 | Cymbopogen citratus             | Dhanwantari     | Poaceae      | Shrub   | 0.55   | Whole plant           | Oral    | Cow and Buffaloes, Sheep, Goat, Cow and Buffaloes  |
|29 | Cydonia oblonga                  | Duba ghasa      | Poaceae      | Herb    | 1.00   | Whole plant           | Oral    | Sheep, Goat, Cow and Buffaloes  |
|30 | Dalbergia sissoo Roxb.           | Sisu            | Fabaceae     | Tree    | 0.26   | Leaf                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|31 | Datura metel L.                  | Dudura          | Solanaceae   | Shrub   | 0.53   | Fruit, Leaf           | Oral    | Sheep, Goat, Cow and Buffaloes  |
|32 | Eclipta alba (L.) Hassk.         | Kalabhaunra     | Asteraceae   | Herb    | 0.24   | Leaf                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|33 | Euphoria hirta L.                | Gadni           | Euphorbiacea | Shrub   | 0.34   | Latex, whole plant    | Topical | Sheep, Goat, Cow and Buffaloes  |
|34 | Ficus bengalesis Linn.           | Bara            | Moraceae     | Tree    | 0.32   | Milk bark             | Oral    | Sheep, Goat, Cow and Buffaloes  |
|35 | Ficus religiosa L.               | Peepal          | Moraceae     | Tree    | 1.33   | Bark                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|36 | Lawsonia inermis L.              | Manjuati        | Lythraceae   | Tree    | 0.26   | Leafs                | Oral    | Sheep, Goat, Cow and Buffaloes  |
|37 | Leucas aspera (Willd.)           | Gayasha         | Lamiaceae    | Herb    | 0.37   | Whole plant           | Oral    | Sheep, Goat, Cow and Buffaloes  |
|38 | Mangifera indica Linn.           | Aamba           | Anacardiaceae| Tree    | 0.16   | Bark                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|39 | Mimusosa pudica L.               | Lajakuli        | Mimosaceae   | Herb    | 0.16   | Leaf                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|40 | Ocimum sanctum Linn.             | Tulasi          | Lamiaceae    | Herb    | 1.11   | Leaf                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|41 | Ocimum basilicum L.              | Dhala dahana    | Lamiaceae    | Herb    | 0.55   | Leaf                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|42 | Phoenix acuila Roxb.             | Sindh khajuri   | Palmaceae    | Tree    | 0.11   | Leaf                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|43 | Piper nigrum Linn.               | golamaricha     | Piperaceae   | Herb    | 0.29   | Leaf and seed         | Oral    | Sheep, Goat, Cow and Buffaloes  |
|44 | Plumbago zeylanica L.            | Sweta chitapuar | Plumbaginaceae| Shrub  | 0.16   | Leaf                  | Oral    | Sheep, Goat, Cow and Buffaloes  |
|45 | Pongamia pinnata (L.)            | Karanja         | Fabaceae     | Tree    | 0.37   | Leaf and bark         | Oral    | Sheep, Goat, Cow and Buffaloes  |
|46 | Portulaca oleracea L.            | Nuni saga       | Portulaceae  | Herb    | 0.21   | Whole plant           | Oral    | Sheep, Goat, Cow and Buffaloes  |
|47 | Punica granatum                  | Dalimba         | Punicaceae   | Herb    | 0.26   | Fruit                 | Oral    | Sheep, Goat, Cow and Buffaloes  |
48. *Ricinus communis* L.  
Jada  Euphorbiaceae  Shrub  0.37  Leaf, 0.23  Seed oil  
GIA- 24 (dysentery)  
GIA- 15 (constipation)  
Whole leaf as feed  Oral  Goat and Sheep

49. *Rouwolfia serpentina* (L.) G Bentham ex W.S. Kurtz  
Serpagandha  Euphorbiaceae  Shrub  0.87  Root  
ED- 20 (watering in eye)  
Juice  Internal  Cow

50. *Solanum indicum*  
Bhejibaigana  Solanaceae  Herb  0.32  Fruit  
PB- 49 (Poisonous feed)  
Fruit pulp  Oral  Cow and Oxen

51. *Tamarindus indica* Linn.  
Tentuli  Caesaipiniaceae  Tree  0.76  Fruit  
PB- 49 (anti venom for snake bite)  
Paste  Topical  Goat and Sheep

52. *Terminalia arjuna* Roxb.  
Shaja  Combretaceae  Tree  0.76  Bark  
GI- 10 (digestion and stomach ache)  
Decoction  Oral  Sheep and Goat

53. *Terminalia chebula* Retz.  
Harida  Combretaceae  Tree  0.16  Fruit 0.23  and bark  
PV- 15 (fever)  
Paste  Topical  Cow and Goat

54. *Tridax procumbens* L.  
Bisalyakarani  Asteraceae  Herb  1.18  Whole plant  
GIA- 50 (diarrhoea)  
Leaf  Oral  Goat and Sheep

55. *Vitex negundo* L. Nocchimaram  
Nirgundi  Verbenaceae  Tree  1.17  Leaf  
GI- 50 (stomach infection)  
Past  Oral  Cow

56. *Ziziphus mauritiana* Lam.  
Barakoli  Rhamnaceae  Tree  1.18  Whole plant 0.62  
HD- 76 (intestinal worms)  
Leaf  Oral  Goat and Sheep

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