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An ethnobotanical study of plants used for the treatment of livestock diseases in Tikamgarh District of Bundelkhand, Central India

Raj Kumar Verma

Department of Botany, Institute of Basic Science, Bundelkhand University, Jhansi-284128, India

PEER REVIEW

Peer reviewer

Dr. P.K. Shukla, Associate Professor, Department of Botany, Brahma Nand Post Graduate College, Affiliated to CS Kanpur University, Kanpur City, UP State, India. Tel: +919450135539,

Comments

This is a valuable research work which deals with ethnoveterinary medicinal plants utilized by rural farmers and experience herbal healers of the studied villages of Bundelkhand. The results are interesting and suggested that surrounding flora of any region may play a key role in the management of animal health care and development of new Ayurvedic preparation. Details on Page S466

ABSTRACT

Objective: To explore and document the information regarding usage of ethnoveterinary medicinal plants utilized by rural farmers and traditional herbal healers for livestock healthcare in Tikamgarh District of Bundelkhnad, Central India.

Methods: The remote villages of Tikamgarh district were regularly visited from July 2011 to June 2012. Following the methods of Jain and Goel (1995) information regarding the usage of ethnoveterinary medicinal plants was collected.

Results: A total of 41 plant species in 39 genera and 25 families were used traditionally with various plant parts and their combinations for the treatment of more than 36 diseases in the studied area. Trees (17 species) were found to be the most used Ethnoveterinary medicinal plants followed by herbs (15 species), shrubs (6 species) and grasses (3) in descending order. The most common diseases cough, diarrhoea and fever were treated by 04 ethnoveterinary medicinal plant species.

Conclusions: The present study recommended that the crop and medicinal plant genetic resources cannot be conserved and protected without conserving/managing of the agro–ecosystem or natural habitat of medicinal plants and the socio–cultural organization of the local people. The same may be applied to protect indigenous knowledge, related to the use of medicinal and other wild plants. Introduction of medicinal plants in degraded government and common lands could be another option for promoting the rural economy together with environmental conservation, but has not received attention in the land rehabilitation programs in this region.

KEYWORDS

Ethnoveterinary medicinal plants, Livestock healthcare, Traditional herbal healers, Bundelkhand, Central India

1. Introduction

The rich and diversified flora of India provides valuable storehouse of medicinal plants. The curative properties of herbs have long been known and are documented in ancient manuscripts such as in Rig Veda, Garuda Purana and Agni Purana. These treatises focus on the potential of plants and herbs to cure human ailments and diseases. Scientists are now documenting various ethnoveterinary practices based on plant drugs. The plant wealth of India also offers the people who tend livestock a rich reservoir in treating the

E-mail: rajk.verma@yahoo.co.in

diseases and ailments of the animals. Seventy six percent population of India is predominantly rural^[1].

In Indian agriculture, livestock plays a key role in the farmers life, they provide farm power, rural transport, manure, fuel, milk and meat, but also a major role in rural economy by providing income and employment to the small hold farmers and other weaker sections of the society. The indigenous knowledge of the veterinary health care system acquired by traditional herbal healers and elderly learned farmers and is orally transformed from one generation to other. It is less systematic and less formalized

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 $[\]rm *Corresponding$ author: Raj Kumar Verma, Department of Botany, Institute of Basic Science, Bundelkhand University, Jhansi–284128, India.

and is usually transferred by word of mouth rather than in writing^[2].

Ethnoveterinary medicine, deal with traditional animal health care which encompasses the knowledge, skills, methods, practices and beliefs about animal health care. Ethnoveterinary medicine is developed by farmers in fields and barns, rather than by scientists in laboratories and clinics. Ethnoveterinary medicine often provides cheaper options than comparable western drugs and the products are locally available and more easily accessible. In the face of these and other factors, there is increasing interest in the field of ethnoveterinary research and development^[3–8].

The possible benefit of plant derived medications constitutes a rewarding area of research, particularly in countries such as India which have a rich biodiversity of natural plant resources coupled with a high prevalence and variety of infectious diseases. The characteristics, sophistication, and intensity of the ethnoveterinary systems differ greatly among individuals, societies, and regions. Hence, documentation of ethnoveterinary medicine from regions having a rich ethnographic and biodiversity setting would be of great significance. Traditional knowledge of ethnoveterinary medicinal plants and their use by indigenous cultures are not only useful for conservation of cultural traditions and biodiversity but also for community healthcare and drug development in the present and future[9]. Documentation of indigenous knowledge and evaluation of the use of plants for a variety of purposes assume greater significance, not just to retain it, but also to keep it alive and make it available for future use because of rapid socio-economic and cultural changes that are

taking place across the traditional community of the region. Keeping this in view, the present studies was initiated, with an aim to identify knowledgeable resource person *i.e.* elderly learned farmers and experienced traditional healers and document their knowledge of on the utilization of ethnoveterinary medicinal plants in Tikamgarh district of Bundelkhand region, India.

2. Material and methods

Bundelkhand region is situated between 23°8′- 26°30′ N latitude and 78°11′- 81°30′ E longitude in central part of India. The geographical location of Bundelkhand is in such a way that it acts as a gateway between the north and south India (Figure 1). The Bundelkhand region comprises of five districts of Uttar Pradesh State viz., Jhansi, Lalitpur, Jalaun, Hamirpur and Banda; six districts of Madhya Pradesh State viz., Datia, Tikamgarh, Chhatarpur, Panna, Damoh and Sagar and Lahar and Bhander tahsils of Bhind and Gwalior districts, respectively. The topography of the region is characterized by its smooth flat lands and inter-mixed undulating topography of varied slope. The Bundelkhand is bounded by the Yamuna river in the north, escarped ranges of the Vindhyan plateau in south, the Sindh River in the north-west and Bhanrer ranges in the south-east. The region is spread over 71618 km² and supports 12.45 million human populations as per 1991 census^[10].

Tikamgarh District is located in the northern part of Madhya Pradesh. It lies on the Bundelkhand Plateau between the Jamni, a tributary of Betwa and Dhasan rivers. It



Figure 1. (A) Location of Bundelkhand in Map of India; (B) Location of Tikamgarh district in Map of Bundelkhand; (C) Map of Tikamgarh district.

extends between the latitude 24°26′ and 25°34′ N and between 78°26′ and 79°21′ Longitudes. The total geographical area of Tikamgarh District is 5048.00 km² and the total population is 1202998. The shape of district is triangular. The northern margin is very irregular. The maximum length of the district is about 119 km from North to South and width about 80 km. Tikamgarh District is bounded by Chhatarpur district to east, Lalitpur district Uttar Pradesh to West, Jhansi to North and Sagar to South. The western and Eastern boundaries are formed by two big rivers.

The climate of Tikamgarh district is semi-arid and has a distinct seasonality on the basis of distribution of rainfall and variation in temperature, the climate of Tikamgarh district can be said to be typically monsoonic and can be divided into four distinct seasons viz., winter, summer, rainy and post rainy season. The winter or cold season extents from December to February, and is marked by minimum temperature and moderate humidity. Occasional showers are also occurs in the cold season during December to January. The south-west rains or monsoon starts from middle of June and continue till last end of September. The normal annual rainfall of Tikamgarh district is 1057.1 mm. About 90.3% of annual rainfall is received during monsoon season. Only 9.7% of annual rainfall takes place in rest months of the year. October and middle of November constitute the post monsoon season. Summer season commences from March and continue till mid of June. May is the hottest month of the year with very high temperature and low humidity.

The remote villages of Tikamrarh district were regularly visited from July 2011 to June 2012.

The information regarding the usage of ethnoveterinary

medicinal plants available in the local area for treating various ailments and disease of livestock, was collected by directly interviewing elderly learned farmers and experienced traditional healers who have traditional Knowledge about these ethno veterinary medicinal plants in the villages of surveyed district^[11]. Questionnaire surveys, participatory observations and field visits were planned to elicit information on the uses of various plants. The plant material was collected and carefully handled for identification by authenticated source. Making herbaria preserved most of the plant materials and all the specimen vouchers were carefully numbered and deposited. The ethno–medicinal value of each plant was enumerated in the following pattern: Botanical name/ Family, Local Name, Parts used and Mode of administration.

The identification of plants was done using the following references: 1)Forest Flora for Pilibhit, Oudh, Gorakhpur and Bundelkhand by P.C. Kanjilal^[12]; 2) Flora of British India by Hooker^[13]; 3) Silviculture of Indian trees by Troupe^[14]; 4) Indian medicinal plants by Kirtikar and Basu^[15].

3. Results

The results of the study are presented in Table 1. The plants are arranged in alphabetical order. For each species botanical name, family, local name, parts used, mode of administration and diseases treated are provided. The rural farmers and traditional herbal healers of villages in Tikamgarh District of Bundelkhand region used a number of ethnoveterinary medicinal plants for healthcare of

Table 1

Ethnoveterinary medicinal plants utilized by rural farmers for livestock healthcare in Tikamgarh District, Bundelkhand, India.

Botanical name (Family)	Ailment/Disease	Part used	Mode of administration
Acacia nilotica Linn. (Fabaceae)	Jaundice	Flower	\blacklozenge About 200 g flower grinded well and mixed with 250 mL. water, the solution so obtained
			is given orally twice daily for 15–20 d to animal to cure jaundice.
	Dysentery	Bark	\bullet The extract of bark is given to animal orally twice a day for 10–20 d to cure dysentery.
All stade wards a New (Assethered)	Diarrhoea and	Leef Deele	\blacklozenge Leaf juice is mixed with equal amount of bark juice of Syzygium cumini is
Adnatoda vasica Nees. (Acanthaceae)	dysentery	Leai, Bark	administered thrice a day for one week to treat diarrhoea and dysentery.
A solo more ales (I.). Come (Perto a sol)	Sun burn	Leaf, Seed	\blacklozenge About 500 g fresh leaves made into paste by grinding and mixed with 100 mL. seed oil
Aegle marmelos (L.) Corr. (Rutaceae)			of Ricinus communis. This paste is applied over skin affected till the rest from sun burn.
Allium cepa Linn. (Liliaceae)	Removal of ecto– parasites	Bulb, Leaf	$\blacklozenge Bulb of onion is grinded well and mixed with 100 mL. of mustard oil and 25 g leaf ash of$
			Musa paradisiaca. The mixture so obtained is externally applied on the skin for removal of
			the ecto-parasites.
		Bulb	igstarrowBulb paste mixed with mustard oil and administered thrice daily for one month for the
	Cough		treatment of cough
Asparagus racemosus Wild. (Liliaceae)	Arthritis	Root	\blacklozenge About 500 g root powder given with milk for one month for the treatment of arthritis in cattle.
	Foots infection, Rheumatism	Leaf, Fruit	\blacklozenge The juice, extracted from leaves (100 g) and fruits (100 g), is applied over foots suffering
Argemone mexicana Linn. (Papavaraceae)			from infections. Same juice is also applied over body parts of cattle for relieving pain from
			rheumatism.
Azadirachta indica A. Juss.(Meliaceae)	Wound	Bark	◆About 500 g bark of Azadirachta indica and 250 g bark of Acacia nilotica is grinded and
			mixed with water. The paste so obtained is applied over wounds till complete recovery.
	Easier delivery	Leaf	\blacklozenge The leaves (100–200) g are given to pregnant buffalo for a month twice a day to easier delivery.
Bamousa arunainacea (Reiz.) wiid.	Diarrhoea	Leaf,	\blacklozenge Equal amount of rhizome and fresh leaf of bamboo is made into paste and given twice a
(Poaceae)		Rhizome	day for 7 d to the cattle suffering from diarrhea.
Butea monosperma (Lam.) Taub. (Fabaceae)	Dysurea, paralysis	Flower	\blacklozenge Decoction of flowers is given to the cattle thrice in a day for one month for the treatment of
			dysurea and paralysis.

Table 1, continued:

International Control Networks				
Calestrate for process (1) R. Property (1) R. Provess (1) France (1)	Botanical name (Family)	Ailment/Disease	Part used	Mode of administration
Asselgniablessing Stack bits Land Object Casing fistule Lim, drahnesson Stack bits Land Object <	Calotropis procera (L.) B. Br	Easier delivery	Flower	\blacklozenge The paste of flower (50 g) mixed along with jaggery (100 g) and given to animal for easier
construction Stack bits Later Later <thlate< th=""> Later Later</thlate<>	(Ascleniadaceae)	Lasier derivery	TIOWEI	delivery.
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bis programment First frag series		As nurrative in	Leaf Bine	The young leaves are cooked and given as purgative. Paste of ripe pods is also
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Cyaolan daryban (time, Pers.) Inernaning lactation Anti-All strenge in the second of	Coriandrum sativum Linn. (Apiaceae)	Loose motion	Seed, Leaf	daily for 7 d to animal to cure loose motion.
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Eclipta prostrata Linn./Asteraceaee Wounds Leaf *Fresh leaves are grinded and boiled with moutand uil. The paste so obtained is applied twice daily for 10-15 d on wounds for early bealing. Fromia elephantum Linn.(Rutaceae) Intestinal worn Leaf *Fresh leaves are grinded well and mixed with S00 L of water and given to cattle one daily for 3 to 4 d to cattle suffering from stomachache. Freus benghalensis Linn. (Moraceae) Towils Leaf *The juice of leaves is used to cure tonsils. Malvaceae) Twitching Bark. *The juice of leaves is used to cure tonsils. Malvaceae Feorer Parse *The juice of leaves is used to cure tonsils. Madhaca indica J.F. Canel Sapotaceae Feorer Parse *About 100 g flower paste, 250 jaggery and 50 water is mixed and given twice daily for seven day to cattle in the case of minigestion. Margiferi indica Linn. (Anacardiaceab Indigestion Frein *The paste is obtained from 50 to 100 g fruit and given along with wheat bread once or twice daily for seven day to cattle in the case of indigestion. Maring a leifera Lamk. (Moringaceae) Forer Leaf *About 100 g flower paste, 250 jaggery and 50 water is mixed and 200 g leaves of Centella astratica and given to cattle for breaking and removal of given to cattle for market with flower along with wheat bread once or twice daily for seven day to cattle in the case of indigestion. Maring a leifera Lamk. (Moringacea) <td>Delonix regia Linn.(Fabaceae)</td> <td>Fever</td> <td>Bark</td> <td>treatment of fever.</td>	Delonix regia Linn.(Fabaceae)	Fever	Bark	treatment of fever.
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Feronia dephantum Linn, (Rutaceae)Intestinal wormLeafFreesb laces are grinded well and given once daily for 3 to 4 d to cattle suffering from stomachache.Ficus benghalensis Linn, (Moraceae)StomachacheRootThe filice of laces is used to cure tonsils.Ficus religious Linn, (Moraceae)TonsilsLeafThe filice of laces is used to cure tonsils.Hibiscus rosa-sinensis Linn.TwitchingBarkBark, about 150–200 g, is grinded well and given once daily for 3 to 4 d to cattle suffering from stomachache.Houraceae)Toward of ecto- parasitesTwitchingLeafHouraceae)IndigestionFruitFleenMangifera indica Linn. (Anacardineeae)IndigestionFruitMentha arensis Linn. (Lamiaceae)FeverLeafMoringa oleifera Lamk. (Moringaceae)FeverLeafMoringa oleifera Lamk. (Moringaceae)Body heatLeafUlcersRootCough ColdLeafMusa paradisiaca Linn. (Lamiaceae)Gody heatLeafOcinum sanctum Linn. (Lamiaceae)Cough, ColdLeafOrigan satisticsTo enhance parasitistGrain atatationOrigan satisticsCough, ColdLeafOrigan satisticsTo enhance parasitistGrain atatationOrigan satistica Linn. (Lamiaceae)Gody heatLeafOrigan satisticsCough, ColdLeafOrigan satisticsCough, ColdLeafOrigan satisticsTo enhance parasitesGrain atatationOrigan sanctum Linn. (Lamiaceae)Cou	Ecupia prostrata Emil(Asteraceae)	wounds	Lear	twice daily for 10-15 d on wounds for early healing.
From replandensis Linn. (Moraceae) Stomachache Root Ficus benghalensis Linn. (Moraceae) Stomachache Root Malvaceae Tonsils Leaf Hobjetia integrifolia (Rook). Planch. Removal of ecto- parasites Bark Holgetia integrifolia (Rook). Planch. Removal of ecto- parasites Easf Maduaceae) Fever fullower functional to the skin for removal of ecto-parasites. Maduacia J.F. Gmel (Sapotaceae) Fever Flow Mangifera indica Linn. (Anacardiaceae) Indigestion Fruit Mangifera indica Linn. (Anacardiaceae) Fever Leaf Diarrhoea, Dysentery Diarrhoea, Dysentery Leaf Pointhea, Dysentery Leaf Minaga paradisiaca at mu, Musaceae) Renoval of ecto- parasites Fever Leaf Orimaga olejfera Lamk. (Moringaceae) Root Pointhea, Dysentery Leaf Misa paradisiaca at mu, Musaceae) Root Root The paste is obtained from 500 100 g pois and given approximate one month for relief from chamatism. Misa paradisiaca Linn. (Musaceae) Root Cough, Cold Leaf Oriman gratistimum Linn. (Lamiaceae) Gouip Leaf Fever Leaf	Faronia alaphantum Linn (Butaceae)	Intestinal worm	Loof	$\blacklozenge {\rm Fresh}$ leaves are grinded well and mixed with 500 L of water and given to cattle once
Ficus benghalensis Linn. (Moraceae)Stomachache.Not<	reionia elephaniam Enni.(Italeeae)	intestinai worm	Leai	daily 10-20 d in case of intestinal worm.
Lead or equipricular limit, claratical productionInstitutionInstitutionFicur areligious Linn, (Moraceae)TomsilsLeafHoloptelia integrifolia (Roch): Planch, (Malvaceae)Removal of ecto- parasitesFeverHoloptelia integrifolia (Roch): Planch, (Limaceae)Removal of ecto- parasitesLeafMadhuca indica J.F. Gmel (Sapotaceae)FeverFlowerMangifera indica Linn, (Anacardiaceae)IndigestionFruitMentha arcensis Linn, (Lamiaceae)FeverLeafMoringa oleifera Lamk, (Moringaceae)Diarrhoea, DysenteryLeafMusa paradisiaca Linn, (Musaceae)Body heatLeaf, RootVicersRootUlcersRootOriman gratissimum Linn, (Lamiaceae)Body heatLeafOriman gratissimum Linn, (Lamiaceae)Removal of ecto- parasitesLeafOriman gratissimum Linn, (Lamiaceae)ConstipationSeedOryza satira L(Poaceae) (Leiphorbicaee)ConstipationSeedOryza satira L(Poaceae) Syzygium cumini (L.) Skeels. Syzygium cumini (L.) Skeels. 	Ficus henghalensis Linn (Moraceae)	Stomachache	Root	\blacklozenge About 100 g root is grinded well and given once daily for 3 to 4 d to cattle suffering from
Fires religions Linn. (Monseeae) Tomsils Leaf The juice of leaves is used to cure tousils. Hibbicus rosa-sinensis Linn. Twitching Bark, about 150–200 g, is grinded well and given with one liter twice daily till complete rest in case of twitching. Holoptelia integrifolia (Roxb.) Planch. Removal of ecto-parasites Leaf Madhucea indica J.F. Gmel (Sapotaceae) Fever Four Mangifera indica Linn. (Anacardiaceae) Indigestion Fruit Mentha arcensis Linn. (Lamiaceae) Fever Leaf Diarrboea, Diarrboea, Diarrboea, Uleers Root Diarrboea, Musa paradisiaca Linn. (Musaceae) Pody heat Leaf, Root Oriman sanctum Linn. (Lamiaceae) Cough, Cold Leaf Origa staria Linn. (Lamiaceae) Root Seed Origa staria Linn. (Musaceae) Body heat Leaf, Root Camiaceae) To enset is optime to so that of deversi is applied on the ulcers of cattle for relear form disgrestion. Oriman gratissimum Linn. Removal of ecto-parasites Orizanda gratus Linn.(Musaceae) Granhaee Orizanda gratus Linn.(Mytraceae) Fever Leaf Oriza and guarate Linn.(Mytraceae)		Stomachaene	1000	stomachache.
Hibscursca-sinensis Linn. Twitching Bark, about 150–200 g, is grinded well and given with one liter twice daily till complete rest in case of twitching. Molavaceae) parasites Bark, about 150–200 g, is grinded well and given with one liter twice daily till complete rest in case of twitching. Madhucea indica J.F. Grnel (Sapotaceae) Fever Flower Heaf juice is applied on the skin for removal of ecto-parasites. Mangifera indica Linn. (Anacardiaceae) Indigestion Fruit * Leaf juice is applied on the skin for removal of ecto-parasites. Mentha arcensis Linn. (Lamiaceae) Fever Leaf * The paste is obtained from 50 to 100 g fruit and given with wheat bread once or twice daily for seven day to cattle truce in a day for 7 d to cure fever. Moringa oleifera Lamk. (Moringaceae) Diarrhoea, Ulcers Leaf Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Vice saits Pod * The rest leaf of Ocinum sanctum Linn. (Lamiaceae) Body heat Ocimum gratissimum Linn. Removal of ecto-parasites Young leaves and roots are given with folder for one week to reduce body heat of cattle Oriza sativa LiPoaceae) To enhance Grain laction * The rest leaf of Ocinum sanctum (Jo g) is boiled in water (200–250) mL and the decoction so obtained is given one or twice in al day for one month to removal of ecto-parasites. Oriza sativa LiPoacea	Ficus religiosa Linn. (Moraceae)	Tonsils	Leaf	• The juice of leaves is used to cure tonsils.
Malvaceae) rest in case of twitching. Holoptelia integrifolia (Roxb.) Planch. Removal of ecto- parasites Leaf Madhuca indica J.F. Cmel (Sapotaceae) Fever Flower Mangifera indica Linn. (Amacardiaceae) Indigestion Fruit Mentha arrensis Linn. (Lamiaceae) Fever Leaf Moringa oleifera Lamk. (Moringaceae) Fever Leaf Musa paradisiaca Linn., (Amaceae) Fever Leaf Wilcers Root Fine test is obtained from 250 g leaves of Mentha arvensis and 200 g leaves of Centella asiatica and given to cattle twice in aday for 7 d to cure fever. Musa paradisiaca Linn., (Musaceae) Body heat Leaf Ocimum sanctum Linn. (Lamiaceae) Body heat Leaf Origa sativa L.(Poaceae) To enhance Fever Tariarious Linn. Removal of ecto- parasites Leaf Origa sativa L.(Poaceae) To parasites Seed Tamarindus indica Linn., (Fabaceae) To para Seed Syzygim cumini (L.), Skeels. Joint pain Bark Tongue sores Fruit Fruit	Hibiscus rosa–sinensis Linn.	Twitching	Bark	◆Bark, about 150–200 g, is grinded well and given with one liter twice daily till complete
Holoptedu autogrytolia (ROXD.) Planch. Hernoval of ecto- parasites Leaf Madhuca indica J.F. Gmel (Sapotaceae) Fever Flower Mangifera indica Linn. (Anacardiaceae) Indigestion Fruit Mentha arrensis Linn. (Lamiaceae) Fever Leaf Moringa oleifera Lamk. (Moringaceae) Fever Leaf Missa paradisiaca Linn. (Musaceae) Fever Leaf Musa paradisiaca Linn. (Lamiaceae) Body heat Leaf, Root Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Poisting and gainer Linno (Lamiaceae) Cough, Cold Leaf Poisting and gainer Linno (Lamiaceae) Body heat Leaf Poisting and gainer Linno (Lamiaceae) Body heat Leaf Poisting and gainer Linno (Lamiaceae) Body heat Leaf Poisting and gainer Linno (Lamiaceae) parasites O comparasites Poisting and gainer Linno (Lamiaceae) parasites O constipation Poisting and gainer Linno (Lamiaceae) parasites O constipation Poisting and gainer Linno (Lamiaceae) parasites O constipation <	(Malvaceae)			rest in case of twitching.
Ultimaceae parasites Madhuca indica J.F. Gmel (Sapotaceae) Fever Flower	Holoptelia integrifolia (Roxb.) Planch.	Removal of ecto-	Leaf	◆Leaf juice is applied on the skin for removal of ecto–parasites.
Madhuca indica J.F. Gmel (Sapotaceae) Fever Flower Flower Mangifera indica Linn. (Anacardiaceae) Indigestion Fruit Flower	(UImaceae)	parasites		Albert 100 - flammants 250 immer and 50 meter is mind and sime tries dails for
Mangifera indica Linn. (Anacardiaceae) Indigestion Fruit • The paste is obtained from 50 to 100 g fruit and given along with wheat bread once or twice daily for seven day to cattle in the case of indigestion. Mentha arvensis Linn. (Lamiaceae) Fever Leaf Diarrhoea, Diarrhoea, Leaf Moringa oleifera Lamk. (Moringaceae) Diarrhoea, Leaf Diarrhoea, Diarrhoea, Leaf Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Musa paradisiacae) Cough, Cold Leaf Orjaz astira L.(Poaceae) To enhance Leaf Psidium guajava Linn. (Mytaceae) Fever Leaf Psidium guajava Linn. (Mytaceae) Fever Leaf Psidium guajava Linn. (Lamiaceae) Constipation Seed Oryza satira L.(Poaceae) To enhance Grain Parasites Constipation Seed Altice of parasites Orone liter decoction of fresh leaves is given oral with folder for 7 d in case of constipation of cattle. Psidium guajava Linn.(Mytaceae) Forer Leaf Psidium guajava Linn.(Fabacea	Madhuca indica J.F. Gmel (Sapotaceae)	Fever	Flower	• About 100 g nower paste, 250 jaggery and 50 water is mixed and given twice daily for
Mangifera indica Linn. (Anacardiaceae) Indigestion Fruit Fr				The paste is obtained from 50 to 100 g fruit and given along with wheat bread once or
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Moringa oleifera Lamk. (Moringaceae)Diarrhoea, DysenteryLeafAbout 100–200 g leaf paste is given twice daily for three to 5 d to cattle for quick relief from diarrhoea and dysentery.Musa paradisiaca Linn. (Musaceae)Body heatLeaf, Root*The paste is prepared from 450–500 g pods and given approximate one month for relief from diarrhoea and dysentery.Musa paradisiaca Linn. (Musaceae)Body heatLeaf, Root*Juice of the roots is applied on the ulcers of cattle for healing and removal of larvae of insects from it.Musa paradisiaca Linn. (Lamiaceae)Body heatLeaf, Root*Young leaves and roots are given with fodder for one week to reduce body heat of cattle •The fresh leaf of Ocimum sanctum (350 g) is boiled in water (200–250) mL and the decoction so obtained is given to cure cough and cold.Orizuna gratissimum Linn.Removal of ecto- parasitesLeafPoidium guajara Linn.(Myrtaceae)To enhance lactationEreaf lactationPsidium guajara Linn.(Myrtaceae)FeverLeafSyzygium cumini (L.) Skeels. (Myrtaceae)Joint painBark Tongue soresMusa paraindus indica Linn.(Fabaceae)SwellingLeafTamarindus indica Linn.(Fabaceae)SwellingLeaf <t< td=""><td>Mentha arvensis Linn. (Lamiaceae)</td><td>Fever</td><td>Leaf</td><td><i>asiatica</i> and given to cattle twice in a day for 7 d to cure fever.</td></t<>	Mentha arvensis Linn. (Lamiaceae)	Fever	Leaf	<i>asiatica</i> and given to cattle twice in a day for 7 d to cure fever.
Moringa oleifera Lamk. (Moringaceae) Dysentery Leaf Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Ocimum sanctum Linn. (Lamiaceae) Cough, Cold Leaf Ocimum gratissimum Linn. Removal of ecto- Parasites (Lamiaceae) To enhance Leaf Oryza sativa L.(Poaceae) Fever Leaf Psidium guajava Linn. (Myrtaceae) Fever Leaf Syzygium cuminis (L.) Skeels. Joint pain Bark Syzygium cumini (L.) Skeels. Joint pain Bark Tamarindus indica Linn.(Fabaceae) Swelling Leaf Tongue sores Fruit Leaf Tongue sores Fruit Fruit Tongue sores Fruit Trige fruits is made into paread is gried midly in oil of mustard and annied on the there wells		Diarrhoea,		◆About 100–200 g leaf paste is given twice daily for three to 5 d to cattle for quick relief
RheumatismPod•The paste is prepared from 450–500 g pods and given approximate one month for relief from rheumatism.Musa paradisiaca Linn. (Musaceae)Body heatLeaf, Root•Juice of the roots is applied on the ulcers of cattle for healing and removal of larvae of insects from it.Musa paradisiaca Linn. (Musaceae)Body heatLeaf, Root•Young leaves and roots are given with fodder for one week to reduce body heat of cattle •The fresh leaf of Ocimum sanctum (350 g) is boiled in water (200–250) mL and the decoction so obtained is given to cure cough and cold.Ocimum gratissimum Linn. (Lamiaceae)Cough, Cold parasitesLeaf To enhance lactation•Leaf orian repared is given once or twice in a day for one month to enhance lactation in cattle. •One liter decoction of fresh leaves is given twice daily till recovery to cure fever. •One liter decoction of fresh leaves is given twice daily till recovery to cure fever. •One liter decoction of presh elaves is given orally with fodder for 7 d in case of constipation of cattle. •Equal amount of bark of Syzygium cumini and Azadirachta indica is boiled in water and the decoction so prepared is spread on the affected joints in case of joints pain. •The fresh leaves, about (400–500) g, are boiled in water and these leaves are tie up on affected part of body to cure swelling till the complete relief. •The fresh leaves, about (400–500) g, are boiled in water and these leaves are tie up on affected part of body to cure swelling till the complete relief.	Moringa oleifera Lamk. (Moringaceae)	Dysentery	Leaf	from diarrhoea and dysentery.
RheumatismPodfrom rheumatism.UlcersRoot-Musa paradisiaca Linn. (Musaceae)Body heatLeaf, RootOcimum sanctum Linn. (Lamiaceae)Body heatLeaf, RootOcimum gratissimum Linn.Removal of ecto- parasites-(Lamiaceae)parasites-Oryza sativa L.(Poaceae)To enhance lactation-Psidium guajava Linn.(Myrtaceae)FeverLeafPsidium guajava Linn.(Myrtaceae)FeverLeafSyzygium cumini (L.) Skeels.Joint painBarkMyrtaceae)Joint painBarkTamarindus indica Linn.(Fabaceae)SwellingLeafTongue soresFruitFruitTongue soresFruitFruit			. I	◆The paste is prepared from 450–500 g pods and given approximate one month for relief
UlcersRootJuice of the roots is applied on the ulcers of cattle for healing and removal of larvae of insects from it.Musa paradisiaca Linn. (Musaceae)Body heatLeaf, RootYoung leaves and roots are given with fodder for one week to reduce body heat of cattleOcimum sanctum Linn. (Lamiaceae)Cough, ColdLeafThe fresh leaf of Ocimum sanctum (350 g) is boiled in water (200–250) mL and the decoction so obtained is given to cure cough and cold.Ocimum gratissimum Linn.Removal of ecto- parasitesLeafItelaf paste is applied externally on skin of cattle for removal of ecto-parasites.Oryza sativa L.(Poaceae)To enhance lactationGrain lactationReice grains are cooked along with black gram, black salts and black pepper. The recipe so prepared is given once or twice in a day for one month to enhance lactation in cattle.Psidium guajava Linn.(Myrtaceae)FeverLeafAbout 50 g seed is given orally with fodder for 7 d in case of constipation of cattle.Syzygium cumini (L.) Skeels.Joint painBarkEqual amount of bark of Syzygium cumini and Azadirachta indica is boiled in water and the decoction so prepared is gread on the affected joints in case of joints pain.Tamarindus indica Linn.(Fabaceae)SwellingLeafThe fresh leaves, about (400–500) g, are boiled in water and these leaves are tie up on affected part of body to cure swelling till the complete relief.Tongue soresFruitFruitThe fresh leaves is fired mildly in oil of mustard and ambied on the tongue sores		Rheumatism	Pod	from rheumatism.
InterferRootinsects from it.Musa paradisiaca Linn. (Musaceae)Body heatLeaf, Root Young leaves and roots are given with fodder for one week to reduce body heat of cattleYoung leaves and roots are given with fodder for one week to reduce body heat of cattleCough, ColdLeafCough, ColdLeafCough, ColdLeafCough, ColdLeafLeafCough, ColdLeafLeafLeafLeaf paste is applied externally on skin of cattle for removal of ecto-parasites.Protection of reshProtection of reshProtection of reshProtection of reshConstipationSeedSyzygium cumini (L.) Skeels.Myrtaceae)SwellingTamarindus indica Linn.(Fabaceae)SwellingTongue soresFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruitFruit<		11	Deat	\blacklozenge Juice of the roots is applied on the ulcers of cattle for healing and removal of larvae of
Musa paradisiaca Linn. (Musaceae) Body heat Leaf, Root Young leaves and roots are given with fodder for one week to reduce body heat of cattle Ocimum sanctum Linn. (Lamiaceae) Cough, Cold Leaf		Ulcers	ROOL	insects from it.
Ocimum sanctum Linn. (Lamiaceae)Cough, ColdLeafOcimum gratissimum Linn.Removal of ecto- parasitesLeaf(Lamiaceae)parasitesLeafOryza sativa L.(Poaceae)To enhance lactationGrain lactationPsidium guajava Linn.(Myrtaceae)FeverLeafPsidium guajava Linn.FeverLeafRicinus communis Linn. (Euphorbiaceae)ConstipationSyzygium cumini (L.) Skeels. (Myrtaceae)Joint painBarkTongue soresSwellingTamarindus indica Linn.(Fabaceae)SwellingTongue soresFruitTongue soresFruit	Musa paradisiaca Linn. (Musaceae)	Body heat	Leaf, Root	\blacklozenge Young leaves and roots are given with fodder for one week to reduce body heat of cattle
Octimum statistimum Linn. Removal of ecto- parasites Leaf decoction so obtained is given to cure cough and cold. Octimum gratissimum Linn. marsites Leaf Leaf Oryza sativa L.(Poaceae) To enhance lactation Grain lactation Constipation Grain Psidium guajava Linn.(Myrtaceae) Fever Leaf Constipation Seed Kicinus communis Linn. (Euphorbiaceae) Constipation Seed About 50 g seed is given orally with fodder for 7 d in case of constipation of cattle. Syzygium cumini (L.) Skeels. (Myrtaceae) Joint pain Bark Constipation Seed Tamarindus indica Linn.(Fabaceae) Swelling Leaf Leaf Tongue sores Tongue sores Fruit Fruit Fruit The ripe fruits is made into paste and mixed with Allium sativum. The mixture so obtained is fried mildly in oil of mustard and applied on the tongue sores	Osimum agnetum Linn (Lamiacaas)	Course Cold	Loof	$\blacklozenge The fresh leaf of Ocimum sanctum (350 g) is boiled in water (200–250) mL and the$
Ocimum gratissimum Linn.Removal of ecto- parasitesLeaf(Lamiaceae)parasitesTo enhance lactationFor enhance lactationOryza sativa L.(Poaceae)To enhance lactationGrain lactationFilePsidium guajava Linn.(Myrtaceae)FeverLeafConstipationPsidium guajava Linn.ConstipationSeedOne liter decoction of fresh leaves is given twice daily till recovery to cure fever.(Euphorbiaceae)Sorggium cumini (L.) Skeels. (Myrtaceae)Joint painBarkTamarindus indica Linn.(Fabaceae)SwellingLeafTongue soresFruitFruitTongue soresTongue soresFruitFruit	Octmum sanctum Linn. (Lamiaceae)	Cougn, Cold	Lear	decoction so obtained is given to cure cough and cold.
(Lamiaceae) parasites Field paster is applied externally on skill of entropy of of entrop	Ocimum gratissimum Linn.	Removal of ecto-	Leaf	◆Leaf naste is applied externally on skip of cattle for removal of ecto-parasites
Oryza sativa L.(Poaceae) To enhance lactation Grain Incerption of the second sec	(Lamiaceae)	parasites	Lical	· Lear paste is appried externary on skin of earlie for removal of eero parasites.
Psidium guajava Linn.(Myrtaceae) Fever Leaf Psidium guajava Linn.(Myrtaceae) Fever Leaf Ricinus communis Linn. Constipation Seed (Euphorbiaceae) Constipation Seed Syzygium cumini (L.) Skeels. Joint pain Bark Tamarindus indica Linn.(Fabaceae) Swelling Leaf Tongue sores Fruit Fruit	Oryza sativa L.(Poaceae)	To enhance	Grain	\blacklozenge Rice grains are cooked along with black gram, black salts and black pepper. The recipe so
Psidium guajava Linn. (Myrtaceae) Fever Leaf Ricinus communis Linn. (Euphorbiaceae) Constipation Seed Syzygium cumini (L.) Skeels. (Myrtaceae) Joint pain Bark Tamarindus indica Linn. (Fabaceae) Swelling Leaf Tongue sores Fruit Fruit		lactation		prepared is given once or twice in a day for one month to enhance lactation in cattle.
Recinus communis Linn. Constipation Seed (Euphorbiaceae) Syzygium cumini (L.) Skeels. Syzygium cumini (L.) Skeels. Joint pain Bark Tamarindus indica Linn.(Fabaceae) Swelling Leaf Tongue sores Fruit	Psidium guajava Linn.(Myrtaceae)	Fever	Leaf	◆One liter decoction of fresh leaves is given twice daily till recovery to cure fever.
(Euphorbiaceae) Syzygium cumini (L.) Skeels. Syzygium cumini (L.) Skeels. Joint pain (Myrtaceae) Bark Tamarindus indica Linn.(Fabaceae) Swelling Tongue sores Fruit Tongue sores Fruit	Ricinus communis Linn.	Constipation	Seed	♦ About 50 g seed is given orally with fodder for 7 d in case of constipation of cattle.
Syzygium cumini (L.) Skeels. Joint pain Bark (Myrtaceae) Joint pain Bark Tamarindus indica Linn. (Fabaceae) Swelling Leaf Tongue sores Fruit	(Euphorbiaceae)			
(myraceae) Tamarindus indica Linn.(Fabaceae) Swelling Leaf Tongue sores Fruit Fruit Tongue sores	Syzygium cumini (L.) Skeels.	Joint pain	Bark	• Equal amount of Dark of Syzygium cumini and Azadirachta indica is boiled in water
Tamarindus indica Linn.(Fabaceae) Swelling Leaf Tongue sores Fruit Tongue sores Fruit Tongue sores The mean neares, about (400–500) g, are bolied in water and these leaves are the up on affected part of body to cure swelling till the complete relief. The ripe fruits is made into paste and mixed with Allium sativum. The mixture so obtained is fried mildly in oil of mustard and applied on the tongue sores.	(Myriaceae)			and the decoction so prepared is spread on the affected joints in case of joints pain. The fresh leaves about $(400-500)$ a are boiled in water and these leaves are times and the second state of the secon
Tongue sores Fruit Tongue sores Fruit	Tamarindus indica Linn.(Fabaceae)	Swelling	Leaf	affected part of body to cure swalling till the complete relief
Tongue sores Fruit obtained is fried mildly in oil of mustard and applied on the tongue sores				 The rise fruits is made into paste and mixed with <i>Allium sativum</i>. The mixture so
		Tongue sores	Fruit	obtained is fried mildly in oil of mustard and applied on the tongue sores

Table 1, continued:

Botanical name (Family)	Ailment/Disease	Part used	Mode of administration
Tegetus erecta Linn. (Asteraceae)	Hydrophobia	Leaf	\bullet About (20–40) g leaves are boiled in 500 mL. of water and the decoction so obtained is
			given once in a day for a month to cattle suffering from hydrophobia.
Tribulus terrestris Linn.	Colic, cough	Leaf	\blacklozenge Juice of fresh leaves is given to animals in case of colic and chronic cough.
(Zygophyllaceae)			
Trigonella foenum– graecum	Easier delivery	Seed,	◆About 100 g sprouted seed is given to pregnant animal once daily for one month for
L.(Fabaceae)			easier delivery.
	Twitching	Seed	\blacklozenge About (25–30) g dried seed powder is given twice daily for 5 to 7 d to animal suffering
			from twitching.
Vigna radiata (L.) R. Wilczek	Cough,Cold	Seed,Seed	\blacklozenge About 250 g seed powder is mixed with 100 mL oil of <i>Arachis hypogea</i> and given twice
(Fabaceae)		Oil	daily for 7 d to cattle suffering from cough and cold.
Zingiber officinale Rosc.	Physically disability	Rhizome	\blacklozenge About 100 g fresh rhizomes is boiled in half liter cow milk and given to physically
(Zingiberaceae)			disable animal twice a day for 15 d.
Vitex negundo Linn. (Verbenaceae)	Diarrhoea	Leaf	◆Dried leaves mixed with fodder are given to the cattle for one week to cure diarrhoea.
Ziziphus jujuba Linn. (Rhamnaceae)	Skin burn	Leaf,Seed	\blacklozenge Leaf paste is mixed with oil of <i>Linum usitatissimum</i> and applied over the areas
		Oil	suffering from skin burn. This treatment is given thrice or fourth a day for one week.

livestock. A total of 41 plant species in 39 genera and 25 families were used traditionally with various plant parts and their combinations for the treatment of more than 36 diseases in the studied area. The rural farmers and traditional herbal healers were using these plants to treat the various diseases of livestock like arthritis, body heat, cold, colic, conjunctivitis, constipation, cough, diarrhoea, dysentery, dysurea, easier delivery, fever, foots infections, hydrophobia, improve appetite, increasing lactation, indigestion, intestinal worm, jaundice, joint pain, loose motion, paralysis, physically disability, removal of ectoparasites, rheumatism, skin burn, snake bite, stomachache, stop bleeding, sun burn, swelling, tongue sores, tonsils, twitching, ulcers and wounds.

Tree (17 species) was found to be the most used Ethnoveterinary medicinal plant followed by herb (15 species), shrub (6 species) and grass (3) in descending order (Figure 2). Out of 15 herbaceous plant species Asparagus racemosus of family Liliaceae was climbing herb and *Musa paradisiaca* of family Musaceae was only large herbaceous plant while out of 3 three grasses *Bambusa arundinacea* was woody perennial grass. The highest number of ethno veterinary medicinal plants was recorded from family Fabaceae having eight plant species followed by Lamiaceae and Poaceae each having three plants species. Five families namely Asteraceae, Liliaceae, Moraceae, Myrtaceae, Rutaceae were contribute two species. Rest of the reported families contributed one species each (Table 2, Figure 3).



Figure 2. Habit of ethno-medicinal plants used by traditional healers.

Table 2

Representation of the families and plants studied at study site.

<u> </u>		
S.N.	Name of family	Name of plants
1.	Acanthaceae	Adhatoda vasica Nees.
2.	Anacardiaceae	Mangifera indica Linn.
3.	Apiaceae	Coriandrum sativum Linn.
4.	Asclepiadaceae	Calotropis procera (L.) R. Br.
5. Asteraceae	Asteraceae	Eclipta prostrata Linn.
	notoracoao	Tegetus erectus Linn.
6.	Euphorbiaceae	Ricinus communis Linn.
7.		Acacia nilotica Linn
		Butea monosperma (Lam.) Taub.
		Cassia fistula Linn.
		Dalbergia sissoo Roxb.
	Fabaceae	Delonix regia Linn.
		Tamarindus indica Linn.
		Trigonella foenum–graecum L.
		Vigna radiata (L.) R. Wilczek
8.	Lamiaceae	Mentha arvensis Linn.,
		Ocimum gratissimum Linn.
		Ocimum sanctum Linn.
9.	- 11	Allium cepa Linn.
	Liliaceae	Asparagus racemosus Willd.
10.	Malvaceae	Hibiscus rosa–sinensis Linn.
11.	Meliaceae	Azadirachta indica A. Juss.
12.		Ficus benghalensis Linn.
	Moraceae	Ficus religiosa Linn.
13.	Moringaceae	Moringa oleifera Lamk.
14.	Musaceae	Musa paradisiaca Linn.
15.		Ps <i>idium guajava</i> Linn.
	Myrtaceae	Syzygium cumini (L.) Skeels.
16.	Papavaraceae	Argemone mexicana Linn.
17.	•	Bambusa arundinacea (Retz.) Wild.
	Poaceae	Cynodon dactyIon (Linn.) Pers.
		Oryza sativa L.
18.	Rhamnaceae	Ziziphus jujuba Linn.
19.	Rutaceae	Aegle marmelos (L.) Corr.
		Feronia elephantum Linn.
20.	Sapotaceae	Madhuca indica J.F. Gmel
21.	Solanaceae	Datura metel Linn.
22.	Ulmaceae	Holoptelia integrifolia (Roxb.) Planch.
23.	Verbenaceae	Vitex negundo Linn.
24.	Zingiberaceae	Zingiber officinale Rosc.
25.	Zvgophvllaceae	Tribulus terrestris Linn.
20.		



Figure 3. Representation of the families and no. of plants studied at study site.



Figure 4. Frequency of plant species used for treatment of various diseases.

The most common disease cough, diarrhoea and fever were treated by 4 ethnoveterinary medicinal plant species followed by cold (3 species), dysentery (3 species), easier delivery (3 species), removal of ecto-parasites (3 species), wounds (3 species), constipation (2 species), indigestion (2 species), rheumatism (2 species), twitching (2 species), while rest of reported ailments were treated by only one plant species (Figure 4).

Different parts of ethnoveterinary medicinal plants were used as medicine by the rural farmers and traditional herbal healers for the treatment of different diseases of livestock. Among the different plant parts, the leaves were found to be most frequently used part for the treatment of various ailments followed by seed, bark, fruit, root, flower, pod, rhizome, bulb and whole aerial plant. The methods of using these plant parts vary according to the nature of diseases. The methods of preparation fall into nine categories *viz.* ash, decoction, extract, juice, oil, paste, powder, solution, boiled form. In some cases various plant parts also used in dried and fresh form directly. Most common method of preparation was paste of different plant parts followed by Juice, decoction, oil, powder, solution, extract, boiled and ash.

The rural farmers and traditional herbal helers were commonly using only two plants namely *Cassia fistula* and Moringa oleifera to treat more than two numbers of diseases of livestock. Acacia nilotica, Adhatoda vasica, Allium cepa, Argemone mexicana, Bambusa arundinacea, Butea monosperma, Calotropis procera, Cynodon dactyIon, Datura metal, Ocimum sanctum, Tamarindus indica, Tribulus terrestris, Trigonella foenum-graecum and Vigna radiata were reported to be used in two numbers of different ailments of livestock. Rest of the plant species were being used for treating one number of different ailments of livestock. Internal consumption of the preparations is involved in the treatment of most of the ailments except skin (sun burn, removal of ecto-parasites foots infections, wounds, ulcers, skin burn) joints and muscle (rheumatism, swelling, joint pain) related health problems and snake bite.

4. Discussion

In Bundelkhand region, diseases are fundamental troubles for the living being including human and animals. Living being has constantly been struggling with diversified types of sickness since early periods. Domestic animals keepers who have close to their animals often have thorough information on diverse disease, their causes and manage. Local people may use a single term for several diseases that cause similar symptoms. Male are dedicated observers of diseases effecting domestic animals, due to their association with milking and grazing and have awareness about troubles associated to lactation, milk letdown, milk quality, etc. The most frequently used resources of drugs are locally and easily accessible plants and their products. The studies conducted in other part of India also support to this finding of present study[16-¹⁹]. Rural farmers and traditional herbal healers have good knowledge of animal behavior and can easily identify sick animal quickly. In most cases they are the first observer of diseases. The farmers of studied area rear their livestock as a part of the family. This knowledge was gained from their own experience or from elders of villages through the word of mouth. The studies carried out by other workers in different part of India also exhibits that rural people and traditional herbal healers have very vast knowledge of ethnoveterinary medicinal plants^[20–25].

Alike present study, leafy part of the plants rank first, among the various plant parts used for treatment of various diseases of the livestock in other studies at different part of India^[26–28]. Of the plants used for the treatment of ailments by the farmers in the present study, some of the plants were reported to treat different types of diseases in animals by the previous researchers in the different states of India^[29–34]. However, disease concepts and treatments vary extensively across societies, and even within a single community among gender, age, learning, and caste.

The flora of district Tikamgarh district of Bundelkhand region has immense pharmaceutical and commercial potential. However, very scanty work^[35-38] have been done on ethnoveterinary medicinal plants in Bundelkhand region. There are several species in this district with very rich commercial importance, but are valuable only in the wild. Nearby accessible and easily available ethnoveterinary medicinal plants provide a cheaper source for treatment of various ailments and diseases as compared to western drugs. The only restriction is the seasonal accessibility of certain plants, for which farmers have acquired different ways to preserve them for off-season uses. The farmers of studied area located in Tikamgarh district have very vast knowledge of traditional ethnoveterinary medicines. However, due to their constant and progressive exposure to modernization, there is danger about disappearance of such rich heritage of information in the course of time. Therefore, documentation of this knowledge is valuable for the farmers and their future generations and for scientific consideration of wider uses of traditional knowledge in treating domestic animals. There is an urgent need of collective efforts from botanist, ethnobotanists and ethnopharmacologists to document, conserve and evaluate the efficiency of these valuable drugs. In order to sustainable development and long term conservation of natural resources of the area; there is a need of active participation of local people in evaluation, planning, implementation and monitoring processes as they are the best judges of the area.

The present study recommended that the crop and medicinal plant genetic resources cannot be conserved and protected without conserving/managing of the agro-ecosystem or natural habitat of medicinal plants and the socio-cultural organization of the local people. The same may be applied to protect indigenous knowledge, related to the use of medicinal and other wild plants. Introduction of medicinal plants in degraded government and common lands could be another option for promoting the rural economy together with environmental conservation, but has not received attention in the land rehabilitation programs in this region.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

Livestock play very imperative role in the life of rural inhabitant of India. In the villages of Bundelkhand region of India rural inhabitant are still dependent on ethnoveterinary plants for the treatment of various ailments of livestock, which evolved over generation of experience and practices and this knowledge is mysterious to the modern world. The available information on ethnoveterinary medicinal plants in Bundelkhand region is not enough. Therefore, there is need to documents this great knowledge of rural farmers and experience herbal healers concerning with heath care of livestock.

Research frontiers

The findings of this research paper are very remarkable particularly ethnoveterinary utilization of Acacia nilotica (jaundice), Asparagus racemosus (arthritis), Argemone maxicana (foots infection), Holoptelia integrifolia (removal of ectoparasite), Oryza sativa (to enhance lactation), Tegetus erecta (hydrophobia), Tamarindus indica (tongue sores). The modes of administration of ethnoveterinary plants for treatment of various ailments are also very distinctive.

Related reports

The findings of this paper are not in close agreement of earlier studied of other workers who have worked on ethnoveterinary medicinal plants in Bundelkhand region. This may be due to several reasons like availability of plants, societies of villages, past gain experience of plants, knowledge of diagnose of disease, availability of modern health facility *etc*.

Innovations and breakthroughs

In India, enough attention has not yet been given to the traditional veterinary herbal remedies. Even ancient Indian literature has not provided much information on veterinary remedies. There has been a rich tradition and indigenous knowledge about animal healthcare in India including Bundelkhand region. Considering above fact the work carried out by author have great significance.

Applications

Ayurveda is a very significance Indian healthcare system, in which drugs are prepared from plants. Thus studied plants may also play a significant role in formulations of new ayurvedic drugs for human and domestic animals.

Peer review

This is a valuable research work which deals with ethnoveterinary medicinal plants utilized by rural farmers and experience herbal healers of the studied villages of Bundelkhand. The results are interesting and suggested that surrounding flora of any region may play a key role in the management of animal health care and development of new Ayurvedic preparation.

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