



RESEARCH ARTICLE

MEDICO-BOTANICAL STUDIES IN RELATION TO VETERINARY MEDICINAL PLANT FROM AKOLA DISTRICT OF MAHARASHTRA

^{1,*}Dhore R.K. and ²Undal V.S.

¹Dr. Manorama and Prof. H. S., Arts, Commerce and Science College, Balapur Dist. Akola (Maharashtra), India

²Ghulam Nabi Azad Arts, Commerce and Science College, Barshitakali Dist. Akola (Maharashtra), India

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ABSTRACT

Plants are useful for treating a variety of diseases of man and also animals. The large no veterinary medicinal plants are found in Akola District of Maharashtra. The plant diversity of Akola district is rich and the tribal people and other depend on veterinary plants used for the treatment for different domesticated animals. Akola district is region of Amravati Division of Maharashtra state. The report focused ethano-veterinary information on 26 medicinal plants species belonging to 20 family, documented using local practitioners. The information is presented through an assessment, meeting, interview and field job during numerous field visits. Highest (3) plant species were using from Cucurbitaceae family of the area by villagers. It reported that majority of herbs species are more (35%) utilizing as compared to tree (34%), climber (23%) and shrubs (8%). Concerned scientific names along with their vernacular name, family, part used and specific disease/disorder cured by medicinal plants of the study area have been reported in the paper. Investigation indicated that leaves 36%, root 29%, stem and bark 9%, flower 7%, seed 4%, fruit, pod and latex 2% plant as most preferred remedial purpose. Out of 41 total ailment/ diseases preliminary recorded from entire Akola district with fever, dysentery, infections were the extensive occurrence. As in Indian agriculture, livestock is playing key role in the farmer's existence, therefore conservation and cultivation of therapeutic plants is essential for sustaining the ethno-veterinary medicinal and cultural resource of mankind.

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INTRODUCTION

In Indian agriculture, livestock plays a key role in the farmers existence, they supply farm power, rural transport, fertilizer, fuel, milk and meat, but also a major role in rural economy by providing revenue and employment to the small hold farmers and other weaker sections of the humanity. Consequently animal health is a major issue of concern for the development of these industries. According to the livestock census (2003), India possesses 185 million cattle population (Yadav, 2007). Also, India is a land possessing rich biodiversity and is counted amongst the mega diversity regions of the world. The impacts of animal diseases are particularly severe for poor communities that although relying heavily on livestock have limited access to modern veterinary services. Additionally majority of livestock raisers in Akola district and allied region are geographically distant from the sites of veterinary stations and those that are closer to the sites may not afford the fees for services. The inadequate funding at the national level for the prevention and control of animal diseases adds to the burden, especially among pastoralists who live in the remote arid and

semi-arid lowland parts of the country. Therefore, a reasonable solution would be to complement modern veterinary health care with traditional care (Sori, *et al.*, 2004). In fact, these practices are still widely applied, often because of the lack of availability or the prohibitive costs of 'modern' veterinary medicines and approaches (Yirga, 2010). The worldwide interest in herbal products has grown significantly. As described by Viegi, *et al.* (2003), cattle, horses, sheep, goats and pigs represent about 70% of the animals treated with herbal remedies, followed by poultry (9.1%), dogs (5.3%) and rabbits (4.3%). This is not only due to a general trend towards the usage of natural products for curing illnesses but also due to the availability of considerable evidence regarding the efficacy of herbal remedies. It equally imperative in many poor rural areas, ethnoveterinary medicine can play an important role in animal production and livelihood development, and often becomes the only available means for farmers treat ill animals (Jabbar, *et al.*, 2005, Shical, *et al.*, 2010). Ethnoveterinary medicine (EVM) as dealing with the folk beliefs, knowledge, skills, methods and practices pertaining to the health care of animals (Tyasi, *et al.*, 2015). Ethnoveterinary medicine is the scientific term for traditional animal health care, encompasses the knowledge, skills, methods, practices, and beliefs about animal health care found among the members of a community.

*Corresponding author: Dhore R.K.,

Dr. Manorama and Prof. H. S., Arts, Commerce and Science College, Balapur Dist. Akola (Maharashtra), India.

The knowledge base differs not only from region to region but also among and within communities. It has been developed through trial and error and deliberate experimentation (Wazala, *et al.*, 2005). In recent years research workers have given importance to traditional knowledge pertaining to ethno-veterinary from different regions and states. Pandey, *et al.*, (2000) recorded 27 ethno-veterinary plants from Gonda region, UP, Reddy, and Raju, (2000) mentioned 35 plants for ethno-veterinary use in Anantpur district AP., Ravikumar, *et al.*, (2004) validated of ethno-veterinary plant resources from Tamil Nadu State, Ramdas and Ghotge, have formed Anthra group a non-government organization and made valuable contribution in ethno-veterinary survey from Andhra Pradesh and Maharashtra (Ramdas, *et al.*, 2000; Ramdas and Yaksi, 2001), Kulkarni and Kumbhojkar, (2002) have made contribution on 128 ethno-veterinary medicinal practices among Mahadeokoli tribe and used for different ailments, Ramalah and Patil, (2005) recorded EVM studies from Nandurbar district, Chitralkha and Jain, (2006) reported ethno-veterinary practices from tribal region MP., Deshmukh, *et al.*, (2011) reported medicinal plants used to treat livestock of Maharashtra, Bhor region of Pune district surveyed for utilization of ethno-veterinary plants (Kamble and Kulkarni, 2013), Some plants were validated for wound healing and maggoty wounds (Kamble, *et al.*, 2014). Swaminathan, *et al.*, (2016) also noted ethno veterinary plants of Shervaroy Hills of Eastern Ghats, India. The folk health practices largely remain undocumented and are passes on from one generation to the other by word of mouth. There is rich and proficient ethno veterinary traditions exist in the villages of India which form fundamental part of the family and plays an imperative social, religious and financial role. They contain of belief, awareness, practices and talent pertaining to health care and supervision of livestock (Sri Balaji, and Chakravarthi, 2010). Keeping the aforesaid facts in observations, the present study was undertaken to record the potential use of folk plants as prominent alternative medicine for livestock to cure various diseases/ disorders in the Akola and allied region of the Akola district.

MATERIAL AND METHODS

Study area

The district of Akola lies in the western parts of the Amravati Division of Maharashtra State and is surrounded by Amravati district in the north and north-east, Yavatmal in the south-east, Washim in the south and Buldhana in the west. The district boundary latitude is 20.17 - 21.16 N and longitude are 76.7-77.4E. The district covered seven tahasil such as Telhara, Akot, Balapur, Akola, Murtijapur, Patur and Barshitakli (Fig. 1). The main river of district is "Purna". Pedhi, Katepurna, Morna, Nirguna and Man are the tributaries of the Purna River. The economy of the district is primarily depending on agricultural sector where 67.5 percent of the population is engaged in agricultural activities (Table 1).

Data collection

The study was carried out among local people counting traditional healers and practitioners with awareness of remedial plants were selected for the collection of ethno medicinal information. For this, numerous field visits will be organized along with medicinemen to collect plant specimen for herbarium and further confirmation.

The information was reported through an assessment, meeting, interview and field job. The information included details about the botanical and familiar name of the plant prescribed, fraction of the plant used, method of preparation (decoction, paste, powder or extract) and medicinal benefits. The information was confirmed through discussions with respondents who practiced the use of the recognized plants for veterinary purposes (Fig. 2). Throughout the investigation, every plant was enlisted, photographed and collected 10-14 inch plant specimen and pressed in the field with collection number. The collected plant specimens from the field along with digital photography and field remarks for additional processing for herbarium and taxonomical recognition. Processed deposit specimens to dry and poisoned with proper HgCl₂ to mount on herbarium sheets with detailed labeling. Botanical identification of the species was done with the help of floras (Naik, *et al.*, (1998); Dhore and Joshi, (1988); Singh and Karthikeyan, (2000)) and also collected plant species were cross-verified with the help of few preserved and digital authentic herbarium specimens. The help was also obtained with proficient taxonomist based of morphological descriptions.

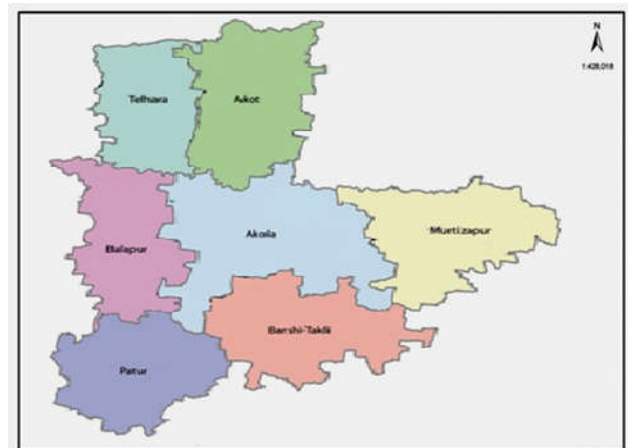


Figure 1: Location map of the study area in Akola district, India



Figure 2: Discussion with elder village residents on therapeutic plant in Sawara (Akot region)

RESULTS AND DISCUSSION

The present investigation based on the interaction with the conventional medicine practitioners, it has been observed that plants in the Akola vicinity are used to cure various diseases such as mastitis, dysentery, arthritis, eye injury, milk disorder, wounding, bone fractures, fever and many more in animals. Table 2 shows the details of the folk medicine, their uses, and modes of preparation. The report focused ethano-veterinary information on 26 plants species belonging to 20 family

documented using local practitioners. Highest (3) plant species were using from Cucurbitaceae family of the area by villagers. Concerned scientific names of medicinal plant along with their vernacular name, family, part used, specific disease/disorder with modes of administration/ uses to cured different Ailment/disease have been emphasized (Table 2). It reported that majority of herbs species are more (35%) utilizing as compared to tree (34%), climber (23%) and shrubs (8%) (Fig.3). The plant parts using were leaves, root, bark, flowers, stem, seed, whole plant, fruit, pod and latex for food supplement/use as a remedy. Investigation indicated that leaves 36%, root 29%, stem and bark 9%, flower 7%, seed 4%, fruit, pod and latex 2% plant as most preferred remedial purpose (Fig. 4). It noted that due to limitation in the seasonal availability of certain plants, for which farmers have acquired different traditions to preserve them for off season uses and most common way of preservation is sun drying. Out of 41 total ailment/ diseases preliminary recorded from entire Akola district with fever, dysentery, infections were the extensive occurrence (Table 1).

Medicinal plants play a key role in the improvement and advancement of recent studies by serving as a preparatory point for the development of novelties in medicine. Herbal medicine has been extensively formulated and used as an integral part of crucial health care in Nigeria, China, Ethiopia and Argentina (Ogbuewu *et al.*, 2015). The veterinary diseases/disorders such as mastitis, foot and mouth disease, diarrhea, ephemeral fever, indigestion and parasitic infection significantly influence the farmer's earnings. Ethno-veterinary practices have great potential to address these as EVP has decentralized local resource-based applications that are secure, efficient and cost effective. It also can lead to reduction of use of antibiotics and other chemical drugs and associated residues in the animal products and microbial resistance (Balakrishnan, *et al.*, 2017). In the present research, majority of the conventional medicines were taken orally, followed by dermal with accounting (Table 2).

These results were analogous to the findings of previous investigators (Ketema *et al.*, 2013; Getu, *et al.*, 2015). They reported that oral administration was found to be the principal route of treatment administration. Additionally oral appliance is the most frequently employed (64%), this conclusion is in agreement with the finding of (Yineger, *et al.*, 2007), who reported that oral route of management was the most widespread (72.41%). Leaf was reported as the most repeatedly used plant part in other Ethnoveterinary studies for the healing of various livestock (Taddese, *et al.*, 2015; Teklay, 2015). The practices conducting in the study region specially Akot and parts of Telhara tahasil were using leaf as a dominant part of the medicinal plant for administration (Figure 4). Largely of the medicinal plants were using from the wild occurrence. Similar results were reported by other studies in the Nation (Taddese, *et al.*, 2015), Pakistan (Farooq, *et al.*, 2008) and Brazil (Monteiro *et al.*, 2011). People in the study area simply went to the wild and harvest them as their need arose and did not bother about the extended term survival of these plants. In current opinion on ethno veterinary medicinal provision, many of the respondents use decoctions and infusions (Table 2). This is in agreement with Masika and Afolayan, (2003), who reported 78% use of decoctions. In the decoction plant material heating in water to boiling point whereas infusion involves soaking in water at ambient temperature overnight. In these both preparations plant materials were crushed prior to boiling or soaking in water. Boiling of plant materials extracts water soluble compounds, it could also degrade or alter actives and could also result in detoxification of some noxious plants, depending on the toxins involved. From the account it suggested that exploration and promotion for the knowledge with village resident especially older practitioners on use of medicinal plant for treatment of various diseases/ disorders is now prerequisite for strengthening opportunity in ethno veterinary competence.

Table 1. Akola district at a glance

S. N.	Particulars	Measure
1	Latitude	20.17 - 21.16 N
2	Longitude	76.7-77.4 E.
3	Total area	5,672.81 Sq. K.
4	Average rainfall	750 to 1,000 mm
5	Minimum and maximum temperature	8°C - 48 °C
6	Total population	1,813,906
7	Population engaged in agricultural conduct	67.5 %
8	Total Villages	992
9	Population in rural area	60.3 %
10	Literates	88.05 %
11	Forest area	6.4 %
12	Total livestock	5.5 lakh

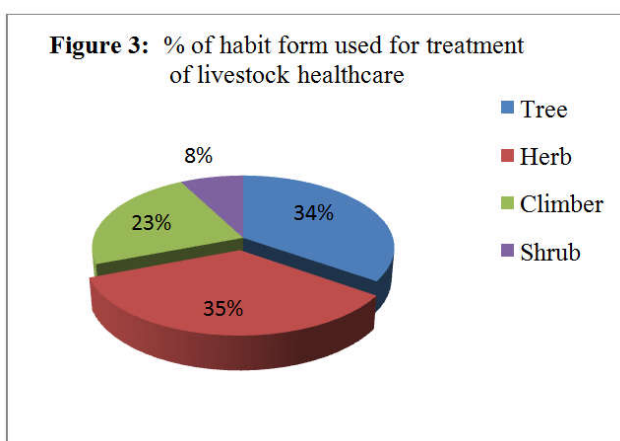


Fig.3. % of habit form used for treatment of livestock healthcare

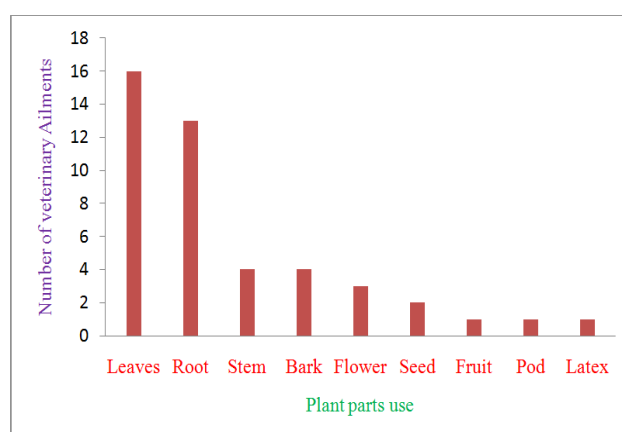


Figure 4: Plant parts used for the treatment of human ailments.

Table 2: Ethno veterinary medicinal plants utilized by rural farmers for livestock healthcare in Akola district (Maharashtra), India.

S.N.	Scientific and local name of plant	Family	Plant part used	Ailment/Disease	Modes of administration/ Uses
1	<i>Acacia nilotica</i> Linn. (Babhul)	Fabaceae	Flower	Jaundice	About 100 g flower grinded well and mixed with 150 ml. water, the solution so obtained is given orally twice daily for 15-20 d to animal
			Bark	Dysentery	The extract of bark is given to animal orally twice a day for 12-16 d.
2	<i>Achyranthes aspera</i> (L.) (Nayuruvi)	Amaranthaceae	Leaf, whole plant	Eye disorder	Leaf is ground with saffron and the filtered juice is used to pour in eyes to get relief from watering in eyes.
				Bites, Injuries, Fever	Handful of leaves made into paste and bandaged over the bites, cuts and injuries for three days. Whole plant powder is also used on fever.
3	<i>Ailanthus excelsa</i> Roxb. (Maharukh)	Simaroubiaceae	Leaves	Blood Dysentery	To reduced the flow of blood in excreta, leaves past in bread wheat is given orally twice a day.
				Tick and Lice	Leaves paste is applied over body to- control tick and lice.
4	<i>Aristolochia indica</i> (L.) (Ghaneri)	Aristolochiaceae	Leaves, Root	Insect bite, Wound	Leaf is made into paste along with pepper and given to cattle, for wound leaf past is applied.
				Mastitis	Make into a powder and administer for 10 days
5	<i>Asparagus racemosus</i> Willd. (Satavari/ Satmuli)	Liliaceae	Root	Arthritis; Milk disorder	About 500 g root powder given with milk for one month for the treatment of arthritis in cattle; the powder root is directly used in wheat powder with appropriate water.
6	<i>Azadirachta indica</i> A. Juss. (Neem)	Meliaceae	Internal bark	Wound; Fever	About 500 g bark of plant and half amount bark of <i>Acacia nilotica</i> is grinded and mixed with water. The paste so obtained is applied over wounds upto recovery; bark is also used for lowering the temperature.
7	<i>Balanites aegyptiaca</i> (L.) (Hingota/ Hinganbat)	Zygophyllaceae	Seed, Bark, leaves	Constipation, Indigestion	Decoction of seed is given twice a day to cure constipation. Bark and leaves is also useful for relief on indigestion.
				Eye infection/ disorder	Bark past is applied twice a day on injured eye for relief.
8	<i>Bauhinia racemosa</i> Lam. (Ajan/ Apta)	Caesalpiniaceae	Leaf and root	Milk increase, Wound and Eye disorders	Leaf extract directly used two times/ day for increasing quantity of milk, Pieces of root cutting hang around neck for prevent of maggot wound. The leaf of plant is used for curing Eye disorders
9	<i>Boerhavia diffusa</i> (L.) (Hogweed/Punarnavaa)	Nyctaginaceae	Roots and Leaves	Dysentery, Fever	It is used for treatment of fever and prolapsed of uterus. The past is also used for curing associated dysentery disorders.
10	<i>Butea monosperma</i> (Lam.) (Palas)	Fabaceae	Flower	Dysurea, Paralysis; Urinary tract obstruct.	Decoction of flowers is given to the cattle thrice in a day for one month for the treatment of Dysurea and paralysis; moreover the past of flower is used for reducing urinary tract difficulty.
11	<i>Cardiospermum helicacabum</i> (L.) (Doska-fodi/Adharvad)	Sapindaceae	Seed	Dysentery, Fever	The powdered seed is used as a solution for relief in some extent.
			Leaf	Stomach ache, Fractures	The leaf extract highly significant against stomach aching. Leaf past is applied over affected parts to recover fractures.
12	<i>Cassia fistula</i> (L.) (Bhingari /Bahwa)	Caesalpiniaceae	Pod	Indigestion	The paste of pods is given twice a day along with wheat bread to cattle.
			Leaf	Improve appetite	The paste of leaf is mixed along with mustard oil and given twice a day for 5 d to progress hunger.
			Root	Eye injury	Powdery root is applied over the injury till the healing.

Table 2: Ethno veterinary medicinal plants utilized by rural farmers for livestock healthcare in Akola district (Maharashtra), India

S.N.	Scientific and local name of plant	Family	Plant part used	Ailment/Disease	Modes of administration/ Uses
14	<i>Citrula colocynthis</i> (L.) (Bitter apple)	Cucurbitaceae	Roots and dried pulp	Constipation, Birth delivery disorder	Decoction of roots is given to the animal twice a day to cure constipation, A mixture of 20 gm root juice of plant, 20 gm honey and 20 gm mustard oil is applied internally for easy opening of uterus during delivery.
15	<i>Cocculus hirsutus</i> (L.) (Jaljamini/Ink-Berry)	Menispermaceae	Stem	Mastitis	100 gm stem ash mix among 100 gm cow milk fat and given to the animal to treat Mastitis
			Roots and Leaves	Appetite disorder	Both parts of plant powder given orally twice per day to enhance appetite especially lactating period.
16	<i>Cocceinia grandis</i> (L.) (Kadu-Dendoye)	Cucurbitaceae	Leaf	Nose disorder	Leaf is ground with ghee and the extract obtained is poured into nostrils to cure running nose.
				Loss of appetite Mastitis	The dried powder leaf is given in bread wheat to increase hunger, the same is given also for curing mastitis.
				Cough and Cold	Warm leaf juice with equal quantity of Ginger is given twice/day for one week
17	<i>Cyperus rotundus</i> (L.) (Nutsedge/ Nutgrass)	Cyperaceae	Rhizome	Fever, stomach disorder and Helminthiasis	Rhizome extract of plant is used for lowering temperature, it equally beneficial for treating stomach disorder. Moreover the past of rhizome also significant against Worm infestation (Helminthiasis).
18	<i>Ficus aurea</i> (L.) (Jangali umbar)	Moraceae	Latex of stem	Blood flow urine, Wound	Reduced the quantity of blood flowing through urinary tract, Latex is applied on the affected parts for wound.
19	<i>Moringa oleifera</i> (L.) (Shewaga)	Moringaceae	Leaf	Dysentery, Diarrhoea	Approximately 100-200 g leaf paste is given two times daily for 3 to 5 d to cattle for sudden relief from diarrhoea and dysentery.
			Root	Ulcers, Worm infection	Extract of the roots is applied on the ulcers of cattle for remedial and elimination of larvae of insects from it.
20	<i>Phyllanthus niruri</i> auct.Non L.(Bhueavala)	Euphorbiaceae	Whole plant	Milk disorder	The whole dried plant powder is given in bread wheat to increase milk quantity specially goat.
			Root	Cough and Fever	Decoction of root is given in two times a day to cure.
21	<i>Tagetes erecta</i> (L.) (Zendu)	Asteraceae	Leaf	Hydrophobia, Foot ulcer	Upto 30-40 g leaves are boiled in 500 mL. of water and the decoction so obtained is given once in a day for 20-30 d to livestock. The past of whole plant is applied over the area.
			Flower	Dysentery	The past of flower is given; the relief is prompt especially in goat.
22	<i>Tinospora cardifolia</i> (Thunb.) Miers (Gulwel)	Menispermaceae	Stem, bark and leaves	Vital and improved growth, Mastitis and Infection	Stem powder utilized for vital and improved growth of goat and cow; bark and leaves used for Skin diseases and Mastitis, the leaf is use for curing vaginal infection.
23	<i>Trichosanthes tricuspidata</i> Lour. (Gawalan wel)	Cucurbitaceae	Root /Fruit	Induced Abortion	Root extract is used on induced abortion.
				Lumbago, Stomach disorder	Both the extract is used to treat Lumbago, powder fruit is also used to cure stomach disorder in a little extent.
24	<i>Tridax procumbens</i> (L.) (Mexican Daisy/ Jayanti)	Asteraceae	Leaves	Diarrhoea, Wound	Infusion of 100gm of dried leaves is given orally to treat diarrhoea. For wound leaf past is applied especially cow.
25	<i>Vitex negundo</i> (L.) (Nirgudi)	Verbenaceae	Leaf	Diarrhoea	Dried leaves mixed with fodder are given to the cattle for one week to cure diarrhoea.
26	<i>Withania somnifera</i> (L.) (Ashwagandha)	Solanaceae	Tubers	Lumbago	Decoction of 1 kg tubers and 2 L. <i>Sesamum indicum</i> seed oil is given to the cattle to treat lumbago.
				Fever	Powder is given for lowering body temperature
				Immune stimulant, Skin disease	Powder is also used as immune stimulant and on few skin diseases.

Conclusion

Small-scale farmers apply both conventional and non-conventional remedy to treat livestock diseases/disorders, in order to progress livestock production. However because of more illiteracy in rural areas they cannot pursue the procedures of drug management appropriately, as much as they find conventional drugs to be expensive. Therefore, resource-restricted farmers utilize ethnoveterinary medicines as their substitute treatment, because they find ethno-veterinary medicines to be economical, easy to access and the procedures are trouble-free to follow when administering as compared to conventional drug. Moreover treatment facility towards interior regions through veterinary experts was extremely restricted, the fact was observed during field visit and communication with village resident. Unfortunately, no serious attempts have been made to document and preserve this immense treasure of traditional knowledge. Lack of a focused conservation strategy could also cause a depletion of this valuable resource (Siva, *et al.*, 2009). In view of this and based on concrete interpretation the following recommendations are forwarded: 1) Hence an investigation is needed to resolve optimal doses and concentrations of the measures and to make out the side effects of the remedies, 2) Moreover, the efficiency of the preparations, techniques, and practices require to be investigate to identify capable plants for apply in livestock improvement, 3) It is equally true that documentation and protection of medicinal plants, therefore highly suggested and 4) The veterinary expert should be increased in addition to strengthen the livestock medical infrastructure especially towards interior villagers.

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REFERENCES

- Balakrishnan, Nair M.N., Punniamurthy, N. and Kumar, S.K. 2017. Ethno-veterinary Practices for Animal Health and the Associated Medicinal Plants from 24 Locations in 10 States of India Research & Reviews. *Journal of Veterinary Sciences*, (3)1: 25-34.
- Chitralkha, K. and Jain, A.K. 2006. Plants used in ethno-veterinary practices in Jhabua District, M.P. *Ethnobotany* 18: 149-152.
- Deo Avinash, Kulkarni, D.K., and Kamble, P.B. 2013. EVM for deworming in the ruminants for sustainable health. Paper presented at International Conference on Inclusive and sustainable growth conducted by Institute of Management Technology, Nagpur and BAIF Development Research Foundation, Pune, 2012 held at BAIF campus, Pune. Online publication- 142-463.
- Deshmukh, R.R., Rathod, V.N. and Pardeshi, V.N. 2011. Ethno-veterinary medicines from Jalna District of Maharashtra State. *Indian Journal of Traditional Knowledge*, 10(2): 344-348.
- Dhore, M.A. and Joshi, P.A. 1988. Flora of Melghat Tiger Reserve. Technical series no.1, Directorate, Project Tiger Melghat, Paratwada; Maharashtra, India.
- Directorate of Census Operations Maharashtra, Census of India. 2011. Maharashtra (Part xii-B) District Census Handbook Akola, Village and Town wise Primary Census Abstract. 1-250.
- Farooq, Z., Iqbal, Z., Mushtaq, S., Muhammad, G., Zafar, M. and Iqbal, A.M. 2008. Ethnoveterinary practices for the treatment of parasitic diseases in livestock in Cholistan desert (Pakistan). *J. Ethnopharmacol.*, 118: 213-219.
- Getu, Alemayehu, Zemedede Asfaw and Ensermu, Kelbessa. 2015. Ethnobotanical study of medicinal plants used by local communities of Minjar-Shenkora District, North Shewa Zone of Amhara Region, Ethiopia. *J. Med. Plant Stud.*, 3(6): 01-11.
- Jabbar, A., Akhtar, M.S., Muhammad, G. and Lateef, M. 2005. Possible role of ethnoveterinary medicine in poverty reduction in Pakistan: Use of botanical Anthelmintics as an example. *J Agri Soc Sci.*, 1(2):187-195.
- Kamble, P.B. and Kulkarni, D.K. 2013. Utilization of Traditional medicinal plants for Ethno-veterinary Medicines from Bhor region, Pune district, Maharashtra, India. *International Journal of Multidisciplinary Research*, 2, 7(5): 82-85.
- Kamble, P.B., Deo, A. and Kulkarni, D.K. 2014. Social Validation of Ethno-Veterinary Medicines for wound healing in Cattle. *Asian Agri- History*, 18(1):63-68.
- Ketema, T., Etana, D., Athanasiadou, S., Tolera, A., Ganga, G. and Houdijk, G.J. 2013. Ethno-medicinal study of plants used for treatment of human and livestock ailments by traditional healers in South Omo, Southern Ethiopia. *J. Ethnobiol. Ethnomed.*, 9:1-5.
- Kulkarni, D.K. and Kumbhojkar, M.S. 2002. Ethno-veterinary Medicinal practices in Mahadeokoli tribe. *J. Maharashtra agric. Univ.*, 27(2): 172-176.
- Masika, P.J. and Afolayan, A.J. 2003. An ethnobotanical study of plants used for the treatment of livestock diseases in the Eastern Cape Province. South Africa. *Pharm Biol.*, 41: 16–21.
- Monteiro, M.V., Bevilaqua, C.M., Palha, M.C., Braga, R.R. and Schwanke, K. 2011. Ethnoveterinary knowledge of the inhabitants of Marajo Island, Eastern Amazonia, Brazil.
- Naik, V.N. and Associates. 1998. Flora of Marathwada. Volume I (First edition), Amrut Prakashan, Aurangabad, India.
- Ogbuewu, I.P., Okechukwu, K.C., Emenalom, O.O. and Okoli, I.C. 2015. Diversity of plants used in animal reproduction in Enugu State Nigeria. *Glob. J. Anim. Sci. Res.*, 3:234-238.
- Pandey, H.P., Varma, B.K. and Narain, S. 2000. Ethno-veterinary plants of Gonda region, U.P. India. In *Ethnobotany and Medicinal plants of Indian subcontinent* (Ed. J.K. Maheshwari) Scientific Publisher, Jodhpur, 199-203.
- Ramalah, P.V. and Patil, M.B. 2005. Ethno-veterinary Plants of Nadurbar district of Maharashtra, India. *Ancient Science of Life* 24 (3) 119 – 125.
- Ramda, S.R. and Yaksi, S. 2001. Changing livelihoods, livestock and local knowledge systems: women stake their claims in Andhra Pradesh and Maharashtra. *Indian Journal of Gender Studies*, 8(2):175-194.
- Ramdas, S.R., Ghotge, N.S., Ashalata, S., Mathur, N.P., Bromme, V.G. and Rao, S. 2000. Ethno-veterinary remedies used in common surgical conditions in some districts of Andhra Pradesh and Maharashtra, India. *Ethnobotany*, 12: 100-112.
- Ravikumar, R.K., Rao, B.S., Bose, S.C. and Sudhakar, K. 2004. Validity of ethno-veterinary practices adopted by farmers in Dindigul District of Tamil Nadu. *J. Asian Agri-History*, 8(1): 55-61.

- Reddy, K.N. and Raju, R.R.V. 2000. Plants in ethno-veterinary practices in Anantpur Dist., A.P. In *Ethnobotany and Medicinal plants of Indian subcontinent* (Ed. J.K. Maheshwari) Scientific Publisher, Jodhpur, 347-357.
- Report on Basic Statistics for Local level Development (BSLLD). 2014. Pilot Study in Rural areas District-Akola (Maharashtra), Directorate of Economics and Statistics, Planning Department, Government of Maharashtra, Mumbai. 1-40.
- Shical, Sh., Jie., Q., Jian, R. and Shen, E. 2010. Ethnoveterinary plant remedies used by Nu people in NwYunnan of China. *Journals of Ethiopia and Ethnomedicine*, 6(24), <http://www.ethnobiomed.com/content/6/1/24>
- Singh, N.P. and Karthikeyan, S. 2000. Flora of Maharashtra State-Dicotyledons, Vol I, (Botanical Survey of India, Calcutta, India).
- Siva, R., Rajasekaran, C. and Mudgal, G. 2009. Induction of somatic embryogenesis and organogenesis in *Oldenlandia umbellata* L., a dye yielding medicinal plant. *Plant Cell Tiss Org Cult.*, 98:205e211.
- Sori, T., Bekana, M., Adugna, G. and Kelbessa, E. 2004. Medicinal plants in the ethno veterinary practices of Borana pastoralists. Southern Ethiopia. *Int J Appl Res Vet Med.*, 2: 220-225.
- Sri, Balaji N. and Chakravarthi, V.P. 2010. Ethno veterinary Practices in India- A Review. *Veterinary World*, 3(12):549-551.
- Swaminathan, U., Chandrasekaran, R. and Ramamoorthy, S. 2016. Ethnoveterinary medicine of the Shervaroy Hills of Eastern Ghats, India as alternative medicine for animals. *Journal of Traditional and Complementary Medicine*, 6:118-125.
- Taddese, B., Abera, D. and Ejeta, E. 2015. Ethnobotanical Study of Medicinal Plants in Selected Horro Gudurru Woredas, Western Ethiopia. *Journal of Biology, Agriculture and Healthcare*, 5: 1.
- Teklay, A. 2015. Traditional medicinal plants for ethnoveterinary medicine used in Kilte Awulaelo District, Tigray Region, Northern Ethiopia. *Advancement in Medicinal Plant Research*, 3(4): 137-150.
- Tyasi, T.L., Zhi-Chao, L.V., Gxasheka, M.D. and Nkohla, M.B. 2015. Effectiveness of elephantorhiza elephantine as traditional plant used as the alternative for controlling coccidian infections in goats. *Journal of Biology Agriculture Healthcare*, 5(8): 163-167.
- Viegi, L., Pieroni, A., Guarrera, P.M. and Vangelisti, R. 2003. A review of plants used in folk veterinary medicine in Italy as basis for a databank. *J Ethnopharmacol.*, 89(2-3):221-44.
- Wazala, W.K., Zessin, K.H., Kyule, N.M., Baumann, M.P., Mathias, E.B. and Hassanali, A.M. 2005. Ethnoveterinary medicine: a critical review of its evolution, perception, understanding and the way forward. *LRRD Pp*, 17:11.
- Yadav, D.K. 2007. Ethno-veterinary practices: A boon for improving indigenous cattle productivity in Gaushalas. *Livestock Research for Rural Development*, 19(6), 1-5.
- Yineger, H., Kelbessa, E., Bekele, T., Lulekal, E. 2007. Ethnoveterinary medicinal plants at Bale Mountains National Park, Ethiopia. *Journal of Ethnopharmacology*, 112: 55-70.
- Yirga, G. 2010. Ethno botanical Study of Medicinal Plants in and Around Alamata, Southern Tigray, Northern Ethiopia. *Current Research Journal of Biological Science*, 2: 338-344.
