International Journal of Sciences & Applied Research

www.ijsar.in

# ETHNOVETERINARY PRACTICES IN ARJINI/MOR TALUKA OF GONDIA DISTRICT, MAHARASHTRA, INDIA

**Kailash Shankar Lokhande**

Department of Botany, SS Jaiswal College, Arjuni/Mor, District Gondia, Maharashtra, India- 441701.
Email: kailash1707@gmail.com

## ABSTRACT

Indigenous communities of Arjuni/Mor Taluka possess ethnoveterinary knowledge about usage of plants and plant products. They depend on traditional animal healthcare practices due to inadequate advanced animal healthcare facilities in rural area.

A total number of 52 ethnoveterinary medicinal plant species under 51 genera belonging to 37 families are used to cure 23 different diseases in the study area. Caesalpiniaceae, Fabaceae, Mimosaceae and Solanaceae were the dominant families with 3 species each and in life form category herbs stand dominant with 20 species followed by trees (16 species), shrubs (10 species) and Climbers (06 species) respectively. Leaf is the most frequently used plant part for medicinal purposes. 31(59.61%) of the ethnoveterinary plants showed a use value (UV) of equals to or more than 0.50. This indicates the high acceptance of these plants in the primary healthcare of domestic animals.

**Keywords:** Indigenous, Healthcare**,** Ethnoveterinary**,** Domestic animals.

## INTRODUCTION

Ethnoveterinary knowledge is the investigation of the plants used by traditional healers in preventing and treating animal diseases, fractures, wounds, in encouraging fertility, productivity, appetite, and so forth. Ethnoveterinary medicine covers peoples knowledge, skills, methods, practices and beliefs about the care of their animals (Mc Corkle, 1986).

This traditional knowledge plays a crucial role in establishing sustainable relationship between man and nature (Wath and Jambu, 2014). Ethnoveterinary medicine often provides cheaper options than comparable western drugs, and the products are locally available and more easy to handy without any side effect (Zschocke et al., 2000; Masika et al., 2000; Tabuti et al., 2003; Yineger et al., 2007; Kone and Atindehou, 2008). May be therefore the dependence of rural mass on the plant based medicines for treating animal is observed which has forced the scientific community to search some promising answers in this direction (Maydeel, 1990).

The characteristics, complexity and intensity of the Ethnoveterinary systems vary greatly among individuals, societies, and regions. Hence, documentation of Ethnoveternary medicine from regions having a rich ethnographic and biodiversity setting would be of great significance (Gadpayale et al., 2014). Despite the fact that Ethnoveterinary medicine has been very crucial for the animal healthcares of most developing countries, it has not yet been well documented and much effort is needed in research and integration activities in these countries (Yineger et al., 2007). This

knowledge is disappearing rapidly due to socio-economic, environmental and technological changes. Now a time, the young generation is not showing interest in conserving this knowledge therefore, it becomes essential to document it before vanishing (Marathe and Deshmukh, 2020). The traditional healers also continued to depend completely on forests and common natural resources to access the plant materials and expressed deep concern over the fact that many of the plants they needed were becoming scarce. (Ghotge and Ramdas, 2008). Keeping the aforesaid facts in view, the present study was undertaken to record and explore the knowledge of ethnoveterinary medicinal plants used by the traditional healers as prominent alternative medicine for cattle to cure various diseases in the study area.

## MATERIALS AND METHODS

### Study area

Gondia district is situated on north-eastern side of Maharashtra State and shares the state borders with Madhya Pradesh on north and Chattisgarh in east. It covers an area of about 5859 sq.km and lies between 20°39 and 21°38 north latitudes and 79° 52’ to 80°42 east longitudes. This study was conducted in 12 villages in Arjuni/Mor Taluka of Gondia district, Maharashtra state, India. Surban, Bondgaon, Gothangaon, Pratapgad, Navegaon, Dewalgaon, Khairi, Morgaon, Sukadi, Dabhana, Tidka and Kesori are the villages in study area (Fig.1). All these villages are surrounded by dense forest.

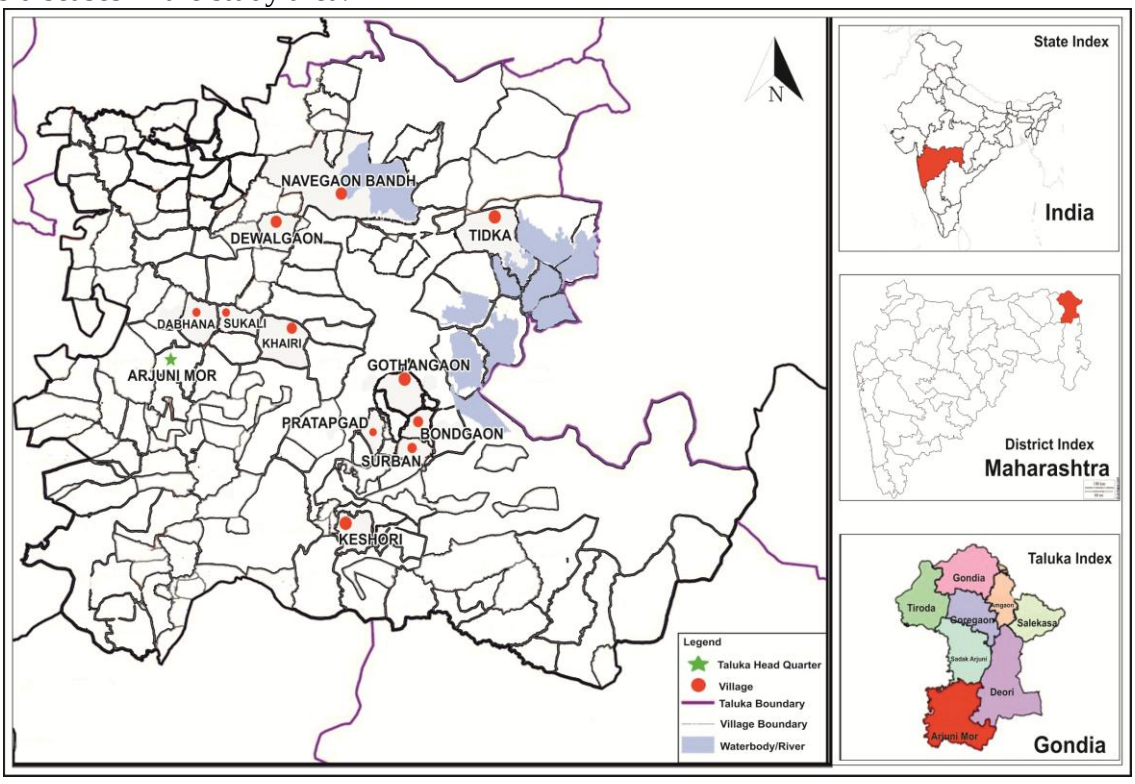


**Fig 1: Map of Arjini/Mor. Taluka of Gondia district, Maharashtra state, India.**

### Ethnic background of study site

Gondia district was under the privilege of 'Gond Raja'. Most of the village habitants of Arjuni/Mor taluka belong to Gond tribes which is second largest tribe in India (Choubey, 2013). According to the the survey of census during 2011 by Indian Government, total population of the

Arjuni/Mor Taluka is 148265. Out of which total scheduled tribes are 33201 comprising 22.39% of total population. The Gond tribes belonging to the minor communities are among the least advanced socially and economically. However, they harbor a lot of knowledge on ethnoveterinary medicinal plants. The whole study area is blessed by nature with its diversified and rich flora including natural tourist places like Navegaon Bandh National Park and Bird Sanctuary, Itiyadoh Dam, Pratapgarh Temple and Nagzira National Park.

**Data collection**

The present study was carried out during 2017-2019. Information on ethnoveterinary medicinal plant species is collected by ethnobotanical field survey and interviews among old tribal peoples, traditional healers and practitioners. The field survey covered different seasons. Plant samples were collected and photographed from their natural habitat and identified with the help of floras (Cook, 1958; Ugemuge,1986; Sharma,1996; Singh,2001).

Ethnobotanical information was collected by using a semi structured questionnaire developed by Jain (1989). A total of 36 inhabitants have been interviewed. The ages of the participants range from 34 to 81 (Table 1). Notes were recorded on local names, useful plant parts, and their utilization by showing photographs of some collected specimens to informants and local peoples. The identified plants are arranged alphabetically with Scientific name, family names, local names, life form, useful plant parts, diseases for which used, mode of treatment and use value (UV) (Table 2).

**Use value (UV)**

The use-value (UV) for each species was used to calculate the citation of plants during interviews, proposed by Phillips et al. (1994) and adapted by Ferreira et al. (2009). It is calculated as follows:

$UV = \Sigma U / n$

Where 'U' is the sum of the total number of use citations by all informants for a given species, divided by the total number of informants (n). This method evaluates the relative importance of each plant species based on its relative use among informants and does not depend on the opinion of the researcher (Ferreira et al., 2009).

**Table.1.**

Characteristics of the study sample, N = 36.

| Socio-economic variables | | Number | % |
|---|---|---|---|
| Gender | Female | 0 | 0 |
| | Male | 36 | 100 |
| Age (years) | 26-35 | 1 | 2.78 |
| | 36-45 | 6 | 16.67 |
| | 46-55 | 12 | 33.33 |
| | 56-65 | 10 | 27.78 |
| | 66-75 | 5 | 13.89 |
| | 76-85 | 2 | 5.56 |

**Table. 2. List of Ethnoveternary plants used by tribal and local people of study area.**

| Scientific name | Family | Local name | Life form | Useful plant parts. | Diseases for which used | Mode of treatment | UV |
|---|---|---|---|---|---|---|---|
| *Abrus precatorius* L. | Fabaceae | Gunja | Herb | Seeds, Leaves | Stomach problems, Swellings. | Seed powder is given orally. Leaf paste is applied on swellings. | 0.44 |
| *Abutilon manihot* (L.) Medik | Malvaceae | Ranbhendi | Shrub | Fruits | Blood dysentery | Powder of 2-3 dried fruits with Nilgiri (Eucalyptus globulus) is given orally. | 0.50 |
| *Acacia nilotica* (L) Willd. | Mimosaceae | Babhul | Tree | Leaves | Mouth ulcer | Paste of Fresh leaves with chicken egg white applied on ulcer. | 0.67 |
| *Acanthospermum hispidum* DC. | Asteraceae | Bokharu | Herb | Leaves | Worms in wounds | Leaf ash is applied on wounds. | 0.72 |
| *Achyranthes aspera* L. | Amaranthaceae | Aghada | Herb | Leaves | Eyes problems. | Leaf extract is pour in eyes. | 0.81 |
| *Adhatoda vasica* Nees | Acanthaceae | Adulsa | Shrub | Leaves, Stem | Fever | Decoction of leaf and stem are given orally | 0.72 |
| *Aegle marmelos* (L.) Corr. | Rutaceae | Bel | Tree | Leaves | Worms in wounds | Leaf paste is applied on wounds. | 0.58 |
| *Aerva lanata* (L.) Juss. | Amaranthaceae | Safed-phuli | Herb | Leaves | Fever | Leaves given to eat. | 0.42 |
| *Ailanthus excelsa* Roxb. | Simaroubaceae | Maharukh | Tree | Stem | Enteritis | Stem is given to eat. | 0.50 |
| *Allium sativum* Linn. | Amaryllidaceae | Lasun | Herb | Bulb | Pneumonia | Extract of heated bulb pour in nose. | 0.86 |
| *Ampelocissus latifolia* (Roxb.) Planch. | Vitaceae | Randraksha | Shrub | Fruit | Flatulence | Fruit-powder mixed with fodder is given to eat | 0.19 |
| *Andrographis paniculata* Nees. | Acanthaceae | Bhuineemb | Herb | Entire Plant | Fever and cough | Decoction of whole plant is given orally | 0.89 |
| *Annona squamosa* L. | Annonaceae | Sitaphal | Shrub | Leaves | Worms in wounds. | Leaf powder is applied on wounds. | 0.61 |
| *Aristolochia bracteolate* Lam. | Aristolochiaceae | Kidmari | Herb | Leaves | Skin infection | Leaf paste mixed with pepper and ginger is applied on infected site. | 0.61 |
| *Asparagus racemosus* Willd | Liliaceae | Shatavari, Marbat | Herb | Root | To longer lactation period | Root powder mixed with safflower cake is given orally. | 0.67 |
| *Azadirachta* | Meliaceae | Kadunimb | Tree | Leaves | Skin | Leaf paste mixed | 0.83 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *indica* A. Juss. | | | | | infection. | with pepper and ginger is applied on infected site. | |
| *Balanites aegytiaca* (Linn.) Del. | Balanitaceae | Hinganbet | Tree | Fruit | Tympany | Fruit powder is applied on head | 0.42 |
| *Bambax ceiba* L. | Bombacaceae | Kathesawar | Tree | Stem | Dysentery. | Bark powder is given to eat | 0.53 |
| *Caesalpinia decapetala* (Rothl) | Caesalpiniaceae | Sagargoti | Shrub | Leaves | Enteritis | Leaves given to eat. | 0.64 |
| *Calotropis gigantea* L. | Asclepediaceae | Rui | Shrub | Latex | Skin infection | leaf latex is applied on wounds and infected parts. | 0.39 |
| *Cardiospermum halicacabum* L. | Sapindaceae | Kapalphuti | Climber | Leaves | Fever | Paste of leaf, pepper and garlic is given to eat. | 0.44 |
| *Cassia fistula* L. | Caesalpiniaceae | Bahava | Tree | Stem, Fruit | Fever, Gastric Problems | Paste of stem,fruit,pepper and garlic is given to eat. | 0.44 |
| *Cassia tora* L. | Caesalpiniaceae | Tarota | Herb | Seed | Skin infection | Seed paste is applied on infected parts. | 0.56 |
| *Catharanthus roseus* G. Don. | Apocynaceae | Jagannath, Sadafuli | Herb | Leaves | Dog bite. | Paste of fresh leaves mixed with lemon juice is applied on wounds. | 0.63 |
| *Choroxylon swietenia* DC. | Rutaceae | Bhera | Tree | Leaves | Mouth infection. | Leaf extract is applied on mouth. | 0.52 |
| *Cissus quadrangularish* L. | Vitaceae | Haddijod | Climber | Stem | Bone fracture. | Stem banded to fractured parts. | 0.69 |
| *Clitoria biflora* L. | Fabaceae | Gokarn | Climber | Entire Plant | Ticks and lice | Extract of the plant is used. | 0.25 |
| *Commelina forskalaei* Vahl. | Commelinaceae | Keri | Herb | Entire plant. | Cough. | Paste of a plant and turmeric is given orally. | 0.19 |
| *Coriandrum sativum* L. | Apiaceae | Sambhar, Kothambir | Herb | Entire plant. | Warms in Foot and Mouth. | Plant extract is applied on foot and mouth. | 0.58 |
| *Curcuma aromatica* | Zingiberaceae | Halad | Herb | Rhizome | Wounds and cuts, Skin infection | Rhizome powder is applied on the wounds and infected parts. | 0.92 |
| *Datura metel* L. | Solanaceae | Dhotra | Shrub | Fruit | Dysentery and cough | Roasted fruits are given orally | 0.58 |
| *Eclipta prostrata* (L.) L. | Asteraceae | Bhrungaraj | Herb | Root | Wounds and cuts | Root paste applied on wounds and cuts. | 0.31 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Ficus bengalensis* L. | Moraceae | Wad | Tree | Leaves | Bone Fracture | Leaf rubbed with oil gently warmed on flame is banded to fractured parts. | 0.50 |
| *Gloriosa superba* L. | Colchicaceae | Kallawi | Herb | Rhizome | Wound | Rhizome mix with wheat flour is applied on wounds. | 0.50 |
| *Grewia hirsuta* | Tiliacae | Ghoturli | Herb | Roots | Cough and wounds. | Root paste is given orally. | 0.33 |
| *Helicteres isora* L. | Sterculiaceae | Muradsheng | Tree | Fruit | Dysentery | Fruit Paste in lemon juice is given orally. | 0.52 |
| *Ipomea hederacea* Jacq. | Convolvulaceae | Godhan | Climber | Stem | Wounds | Paste of stem is applied on wounds. | 0.42 |
| *Linum usitatissimum* L. | Linaceae | Jawas | Herb | Seeds | Tympany | Linseed oil given in food. | 0.47 |
| *Melia azadirachta* L. | Meliaceae | Bakan | Tree | Leaves | Enteritis, Tympany | Leaves given to eat. | 0.50 |
| *Mimosa pudica* L. | Mimosaceae | Lajalu | Herb | Leaves | Fever | Paste of leaf, pepper, garlic and onion is given to eat. | 0.36 |
| *Momordica diocia* Roxb. | Cucurbitaceae | Katwal | Climber | Rhizome | Black quarter | Extract of rhizome and tobacco is given to drink. | 0.22 |
| *Pergularia extensa* (Forssk.) | Asclepiadaceae | Utaranvel | Climber | Leaves | Conjunctivitis | Leaf juice is applied on the eyes | 0.33 |
| *Pongamia pinnata* L. | Fabaceae | Karanji | Tree | Leaves | Fever, Dysentery | Leaf and pepper paste is given orally. | 0.75 |
| *Psidium guava* L. | Myrtaceae | Peru | Tree | Leaves | Enteritis | Leaves given to eat | 0.28 |
| *Ricinus communis* L. | Euphorbiaceae | Erandi | Shrub | Leaves | Wound, Indigestion | Leaf paste is applied on wounds, and given orally for indigestion. | 0.72 |
| *Rumex nepalensis* Spreng | Polygonaceae | Ranpalak | Herb | Root | Food poisoning | Root juice is given orally. | 0.22 |
| *Salanum xanthocarpum* Schrad & Wend | Solanaceae | Dorali | Herb | Fruit | Fever | Decoction of fresh boiled unripe fruits is given orally. | 0.19 |
| *Semecarpus anacardium* L.f. | Anacardiaceae | Bibba | Tree | Fruit | Mouth & Foot diseases. | Paste of Fruits, Coriander and asafoetida is applied on infected parts. | 0.56 |
| *Tamarandus indica* | Mimosaceae | Chinch | Tree | Leaves, Fruit | Stomach and | Leaves and Fruits are mixed with | 0.72 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | digestive problems. | fodder and given orally. | |
| *Terminalia bellirica* (Gaertn.) Roxb | Solanaceae | Behada | Tree | Stem | Dysentery. | Stem decoction with Eucalyptus oil is given orally. | 0.44 |
| *Vitex negundo* L. | Verbenaceae | Nirgudi | Shrub | Leaves | Muscular pain. | Warm extract of leaf is applied on muscles. | 0.50 |
| *Woodfordia fruticosa* (L.) Kurz. | Lythraceae | Dhayati, Dhak | Shrub | Flower | Dysentery. | Flower extract with stem extract of *Azadirachta indica* is given to drink. | 0.28 |

**Table 3: Life form /Habit wise distribution of Ethnoveternary plants in study area**

| Sr.No | Habit | No. of plants | % |
|---|---|---|---|
| 1. | Herb | 20 | 38.46 |
| 2. | Shrub | 10 | 19.23 |
| 3. | Tree | 16 | 30.76 |
| 4. | Climber | 06 | 11.53 |

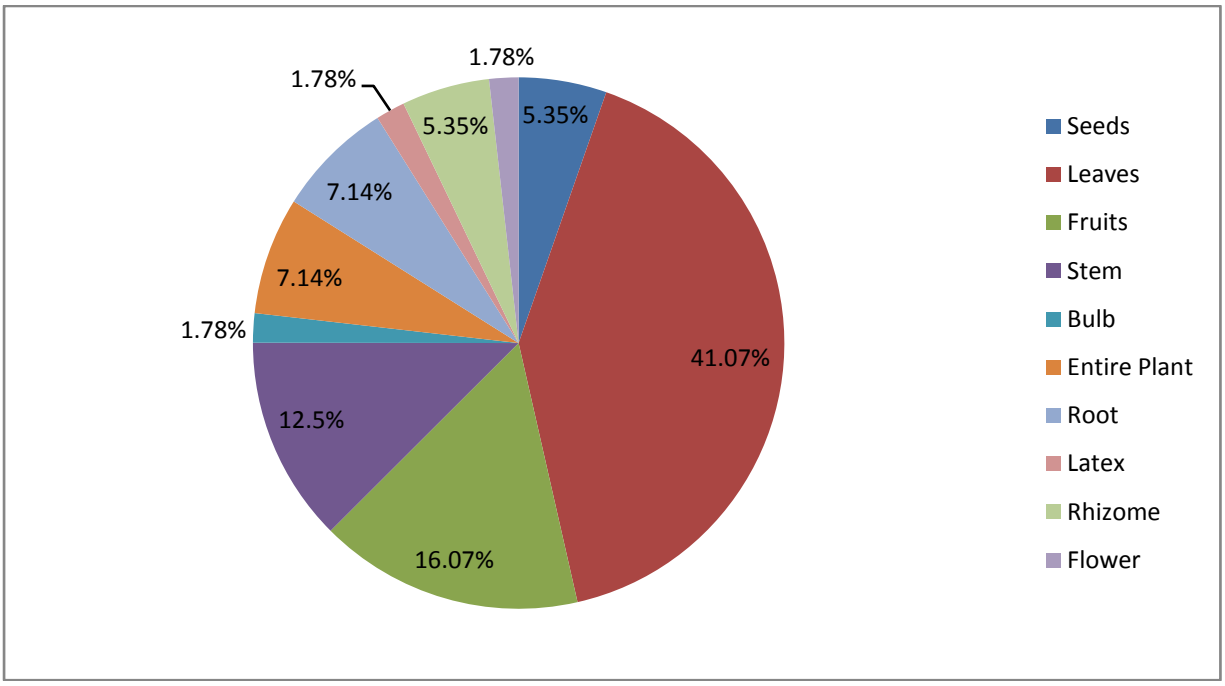


**Fig.2: Classification of Ethnoveternary plants on the basis of plant parts used.**

## RESULTS AND DISCUSSION

A present study was undertaken to identify and document the ethnoveterinary medicinal plants in Arjuni/Mor Taluka of Gondia district, Maharashtra state, India. A total number of 52 ethnoveterinary medicinal plants from 37 families

belonging to 51 genera were recorded. Among the 37 -families, the most widely utilized plant species belong to Caesalpiniaceae, Fabaceae, Mimosaceae and Solanaceae with 3 species each followed by Acanthaceae, Amaranthaceae, Asclepediaceae, Asteraceae, Meliaceae, Rutaceae and Vitaceae with 2 species each, and the rest of the twenty six families with single species (Table.2).

Many researchers also recorded the dominance of Caesalpiniaceae, Fabaceae, Mimosaceae and Solanaceae among ethnoveterinary medicinal plants (Prasanna and Vishnuvardhan., 2017; Gadpayale et al., 2014; Deshmukh et al.,2011; Patil and Patil., 2001; Patil and Patil., 2013). Dhore and Undal (2017) have also recorded that the species under the Euphorbiaceae, Asteraceae, Solanaceae, Convolvulaceae, Poaceae, Fabaceae, Amaranthaceae, Caesalpiniaceae, Mimosaceae and Tiliaceae families are frequently used as medicinal plants.

A total of 36 informants (at age of 28 to 83), having rich knowledge and experience of the use of ethnoveterinary medicinal flora were interviewed (Table 1). 46-55 year age group were dominant (33.33%) among the informants. The observations from the study show that the traditional knowledge about medicinal plants and their uses was declining day by day among the younger generation. The same observation was made by Wath and Jambu (2014); Marathe and Deshmukh (2020).

While analyzing the life forms, it was noticed that 20 species were herbs, 16 trees, 10 shrubs and the remaining 6 were climbers (Table.3). Several researchers also found similar results with this study regarding the dominance of herbaceous plants in the Ethnoveterinary uses (Reang et al., 2016; Pranjale and Dube., 2016).

These ethnoveterinary medicinal plants in the study area were used to cure about 23 different ailments of livestock like wounds, dysentery, fever, cough, skin infections, enteritis, mouth and foot infection, stomach problems, tymphany, bone fracture, black quarter, conjunctivitis etc. Ramalah and Patil (2005); Pawar and Vidhyamandirs (2020); Mishra (2011); Bharali et al.(2015); Kamble and Kulkarni (2016) also reported the same ailment categories in different parts of India. Tribal and local peoples in study area uses different preparation methods i.e. decoction, extract, juice, powder, infusion, paste and Oil.

The parts of the plants used for medicinal purposes were stem, leaf, root, fruit, seed, entire plant, rhizome, bulb, flower and latex. Among the total plant parts leaves were the most frequently used plant parts (23 spp.) followed by fruit (9 spp.), stem (7 spp.), Entire plant (4 spp.), root (4 spp.), seed and rhizome(3 spp. each), bulb, flower and latex (1 spp. each) (Fig.2., Table 2). Leaves and roots were the most preferred plant parts as they contain a high concentration of the bioactive compounds (Ullah et al. 2013). In India the principal use of leaves was reported by many researchers (Somkuwar et al. 2015; Hema et al. 2016; Swaminathan et al. 2016; Nigam and Sharma., 2010; Sehgal and Sood., 2013).

From this study, it was confirmed that the aerial part of the plant is the most preferred plant parts (78.57%) than that of the underground and whole plant parts (21.43%). Ethnoveterinary medicinal plants in life form category herbs stand dominant with 20 species followed by trees (16 spp.), shrubs (10 spp.) and Climbers (06 spp.) respectively. This study result shows coherence with the study conducted by Pranjale and Dube (2016). Showkat et al.( 2013); Galav et al.(2013); Dhore and Undal (2017) are also recorded predominant use of herbs, trees, shrubs and climbers as ethnoveterinary medicinal plants.

The use value of the plant was appraised to study the importance of ethnoveterinary medicinal plants used in the study area. The plants with high use value indicate the frequent use whereas the low use value indicates least prefer. It is observed that about 31 plant species (59.61%) show the use value of more than 0.50 (Table 2). This result shows that tribal and local peoples in study area used these plants frequently for curing various ailments of domestic animals. The present study reported *Curcuma aromatic* has the highest use value (0.92), followed by *Andrographis paniculata* (0.89), *Allium sativum* (0.86), *Azadirachta indica* (0.83) and *Achyranthes aspera* (0.81). The lowest use value reported species are *Salanum xanthocarpum* , *Commelina forskalaei* and *Ampelocissus latifolia* with use value 0.19 each. Several researchers have reported the use of Curcuma aromatic in a different treatments such as wounds,cuts and skin infection (Hema et al., 2016; Reang et al., 2016; Mishra., 2011; Bhatt et al., 2019; Phondani et al., 2010).

Several plants are already examined for their pharmacological activity, but further research on many more plant species are needed to test them for phytochemical and pharmacological importance.

## CONCLUSION

Live stocks play an important role in tribal culture and livelihood. This study revealed that most of the tribal and local peoples in and around the study area use plants for their ethnoveterinary medicinal practices due to the unavailability of modern ethnoveterinary medicinal facilities. Inhabitants of study area were using 52 ethnoveterinary medicinal plants belong to 37 different families. The use value of 31 plant species is more than 0.50.This imply that study area have rich diversity of ethnoveterinary medicinal plants and populace had great traditional knowledge regarding the uses of these plants. This knowledge survived by being passed from word of mouth but get vanishing very rapidly because young generation does not take interest in such practices. Therefore it is necessary to record such type of valuable verbal information before it get lost forever. This traditional knowledge of ethnoveterinary medicinal plants is a potential source to discover new drugs and will be helpful for further phytochemical and pharmacological investigation of new bioactive compounds for the treatment of various ailments.

## ACKNOWLEDGEMENTS

I would like to thank all the farmers, owners of cowsheds and animal custodians who liberally shared their time and knowledge on uses of ethnoveterinary medicinal plants with me. I also grateful to the students of department of Botany, S.S.Jaiswal College, Arjuni/Mor of Gondia District who as an inhabitant gives us valuable information of the vegetation in study area.

## REFERENCES

1) Bharali R., Dutta B.K. and Gogoi P., 2015, Studies on the Ethno-veterinary plants used by the Nepali community of Nagaon and Sonitpur Districts of Assam, India. East Himalayan Society for Spermatophyte Taxonomy, ISSN: 0973-9467, 9(1): 26 – 39.
2) Bhatt P. R., Pandya K.B., Patel U. D., Patel H. B. and Modi C. M., 2019, Survey on Ethnoveterinary Practices around Junagadh, Gujarat, India. Indian Journal of Pharmaceutical Sciences. pp 161-167.
3) Choubey TK. The Working Plan of Gondia Forest Division (Nagpur Circle) Volume – I and II. Government of Maharashtra.2013-14 to 2022-23.
4) Cook T. Flora of the Presidency of Bombay Vol. I-III. Botanical

Survey of India -REPR, Calcutta, India.1958.

5) Deshmukh RR, Rathod VN and Pardeshi VN (20 1 1). Ethnoveterinary medicine from Jalna district of Maharashtra state. Indian Journal of Traditional Knowledge. 10 (2): 344-348.
6) Dhore R.K. and Undal V.S., 2017, Medico-botanical studies in relation to veterinary medicinal plant from Akola district of Maharashtra., International Journal of Current Research Vol 9-11, pp.61725-61731.
7) Ferreira F.S, Brito S.V, Ribeiro S.C, Almeido W.O, Alves R.R.N.,2009, Zootherapeutics utilized by residents of the community Poco Dantas, Crato-CE, Brazil. Journal of Ethnobiology and Ethnomedicine.; 5, 21.
8) Gadpayale J.V., Khobragade D.P., Chaturvedi A.A., 2014, Traditional Ethno-Veterinary practices in Bhandara district (M.S.) India., International Journal of Sciences and Applied Research., IJSAR, 1(2), 91-99.
9) Galav P., Jain A. and Katewa S.S., 2013, Traditional veterinary medicines used by livestock owners of Rajasthan, India., Indian Journal of Traditional Knowledge., Vol. 12(1),pp. 47-55.
10) Ghotge N and Ramdas SR, 2008. Plants used in animal care. Pub. by the Anthra Colletive, N.D.A. Road, Bavdhan, Pune -411021. pp. 1-515.
11) Hema Sayee R., Gayathri K., Femina Banu S., Kowsalya S., Kokila M., Nandhini S.,Thirumalaisamy G. and Senthilkumar S., 2016, Ethnoveterinary medicine: A boon for animal health, International Journal of Science, Environment and Technology, Vol. 5, No 6, 4006 – 4012, ISSN 2278-3687 (O) 2277-663X (P).
12) Jain, SK., 1989. Methods and approaches in Ethnobotany. Society of Ethnobotanists, Luknow, India.
13) Kamble P. B. and Kulkarni D. K., 2016, Ethno-veterinary medicinal plant resources for wound healing and maggoty wound from Bhor region, Pune district, Maharashtra. Life Sciences Leaflets, ISSN 2277-4297,P-92-101.
14) Kone, W.M. & Atindehou, K.K., 2008. Ethnobotanical inventory of medicinal plants used in traditional veterinary medicine in Northern Cote d'Ivoire (West Africa). South Afr. J.Bot. 74: 76 – 84.
15) Marathe V. R and Deshmukh M.M.,(2020), Ethno-veterinary medicinal plant species of Hadgaon Taluka, Nanded District, Maharashtra, India. Int. J. of. Life Sciences, ISSN:2320-7817(p),Vol. 8(2): 404-410.
16) Masika, P.J.; Van Averbeeke, W. & Sonandi, A. 2000. Use of herbal remedies by small scale farmers to treat livestock diseases in central Eastern Cape Province, South Africa. J South Afr. Vet. Assoc. 71: 87 – 91.
17) Maydeel Hans J, 1990. Arbres et arbustes du sahel leurs caracteristiques etleurs utilization. GT2.
18) Mc Corkle CM, An introduction to ethnoveterinary research and development, J Ethnobiol, 6(1)(1986) 129-149.
19) Mishra Dibakar, 2011, Ethnoveterinary Practices and use of herbal medicines fortreatment of skin diseases in cattle : A study in Polsara Block, Ganjam District, Orissa, India. Veterinary World, Vol.4(6): 250-253, DOI :10.5455/vetworld.4.250
20) Nigam G. and Sharma N.K., 2010, Ethnoveterinary plants of Jhansi district, Uttar Pradesh., Indian

Journal of Traditional Knowledge. Vol. 9(4),pp. 664-667.

21) Patil H. M. and Patil S. J. (2013) Ethno-veterinary medicinal preparations of tribals from shirpur tahsil, dhule district, Maharashtra, India, KU Journal of Science, Engineering and Technology Vol. 9,(I);134-139.
22) Patil M. V., Patil, D.A., 2001. Ethnoveterinary herbal medicines from Nasik District (Maharashtra). Journal of Non-timber Forest Products 8(1-2), 19-24.
23) Pawar N.B., Vidhyamandirs M. G., 2020, Ethno-veterinary plants of Baglan region from Nashik district, Maharashtra. International Journal of Research and Analytical Reviews (IJRAR) Vol. 7-1, ISSN 2349-5138.
24) Phillips O, Gentry A.H, Reynel C, Wilki P, Gávez-durand C.B. Quantitative ethnobotany and Amazonian conservation. Conservation Biology. 1994; 8, 225–248.
25) Phondani P. C., Maikhuri R. K. and Kala C. P., 2010, Ethnoveterinary uses of medicinal plants among traditional herbal healers in Alaknanda catchment of Uttarakhand, india., Afr. J. Trad. CAM -7 (3): 195 – 206.
26) Pranjale Arati, Dube K. G., 2016, Ethno-Veterinary Traditional Knowledge of Some Plants Used in Wardha district (Maharashtra). International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064. Volume 5 Issue 5.
27) Prasanna Kumari P., Vishnuvardhan Z., 2017, A Survey on the ethnomedicinal practices of Konda reddi tribe from Polavaram Mandal, Andhra Pradesh, India., International Journal of Computational Engineering Research (IJCER), ISSN (e): 2250 – 3005,Vol. 7-8.
28) Ramalah P.V. and Patil M.B., 2005 Ethno – veterinary Plants of Nadurbar district of Maharashtra, India Ancient Science of Life Vol: XXIV (3) ,P-119 – 125.
29) Reang I, Goswami S, Pala NA, Kumar M, Bussmann RW (2016) Ethnoveterinary applications of medicinal plants by traditional herbal healers in Reang Tribeo South district,Tripura, India. Med Aromat Plants 5: 234. doi:10.4172/2167-0412.1000234
30) Sehgal Anju Batta and Sood S.K., 2013,Ethnoveterinary Practices for Herbal Cure of Livestock Used by Rural Populace of Hamirpur, (H.P.), India. IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS),ISSN: 2319-2372,Vol. 3-1, PP 07-14.
31) Sharma B.D., Karthikeyan S. And Singh NP. Flora of Maharashtra State: Monocotyledons. Botanical Survey of India. Calcutta, India, 1996.
32) Showkat Aziem, Chamola B. P., Subhasis Mahato and Nazir A. Pala, 2013, Utilization and traditional knowledge of ethno- veterinary medicinal plants in Tehri district of Garhwal Himalaya, India., International Journal of Indigenous Medicinal Plants, ISSN: 2051-4263, Vol.46-2.
33) Singh N.P. and Karthikeyan S. Flora of Maharashtra State: Dicotyledons Vol.-II. Botanical Survey of India, Calcutta, India, 2001.
34) Somkuwar S.R., Chaudhary R.R., Chaturvedi A., 2015; Knowledge of ethnoveterinary medicine in the Maharashtra State, India., IJSAR, 2(1), 90-99.
35) Swaminathan Usha, Chandrasekaran Rajasekaran, Ramamoorthy Siva., 2016, Ethnoveterinary medicine of the Shervaroy Hills of Eastern Ghats,

36) India as alternative medicine for animals. Journal of Traditional and Complementary Medicine, 6-118-125
37) Tabuti J.R.S.; Dhillon S.S. & Lye K.A., 2003. Ethnoveterinary medicines for cattle (Bos indicus) in Bulamogi country Uganda: plant species and mode of use, J. Ethnopharmacol, 88: 279 – 286.
38) Ugemuge N.R. Flora of Nagpur District. Shree Prakashan, Nagpur, India,1986.
39) Ullah M, Khan M.U, Mahmood A, Malik R.N, Hussain M, Wazir S.M, Daud M, Shinwari Z.K. An ethnobotanical survey of indigenous medicinal plants in Wana district South Waziristan agency, Pakistan. Journal of Ethnopharmacology. 2013; 150, 918–924.
40) Wath M. and Jambu S., 2014. Ethnoveterinary survey of herbal therapy for treating livestocks of Melghat region (Maharashtra). International Journal of plant, animal and environmental sciences, Volume-4, Issue-3.
41) Yineger, H.; Kelbessa, E.; Bekele, T. & Lulekal, E. 2007. Ethnoveterinary medicinal plants at Bale Mountains National Park, Ethiopia. J. Ethnopharm. 112: 55 – 70.
42) Zschocke, S.; Rabe, T.; Taylor, J.L.S. Jager, A.K. & Van Staden, J. 2000. Plant part substitution- a way to conservation of dangered medicinal plants? J. Ethnopharm. 71: 281 – 292.