

PLANTS FOR CATTLE HEALTH: A REVIEW OF ETHNO- VETERINARY HERBS IN VETERINARY HEALTH CARE

¹Sandip Chakraborty, ²Saumen Kanti Pal

¹Veterinary College, Bengaluru, Karnataka, India; ²College of Veterinary Science, Khanapara, Guwahati, Assam

Corresponding Author Email: sandipc_85@yahoo.com

Abstract

Ethno-veterinary and herbal practices have been in use for centuries, resulting in transfer of knowledge to the common people of the society including the farming sector. The main advantages lie in the facts that they are accessible, easy to prepare and administer, with little cost involved. The *Atharva-Veda* mentions turmeric and yellow birds into which jaundice is charmed to enter, leaving the human patient. From such beginnings, man being guided by the instincts of the lower animals and the intuition of the best among his own species, has evolved the present complex system of the healing science in the service of health and life that finds its appropriateness in the context of cattle farming too. Even though the modern developments in therapeutic field brought about a rapid decline in traditional medicine, the plant-based remedies are still having a crucial role as potential source of therapeutic aids in health systems all over the world for both humans and animals. Nowadays immune-based therapies are gaining more importance than monovalent approaches which are having limited benefits. As far as the cattle industry is concerned, herbal plants are used as health promoters and at the same time for the treatment of diseases. Herbs are used variously for infections as anthelmintic and acaricidals and have got implications in surgical and gynaecological interventions as well as in bovine mastitis. Apart from the aforesaid uses, an array of herbal plants have been reported which are having immunomodulatory effects like modulation of cytokine secretion, histamine release, immunoglobulin secretion, class switching, cellular co receptor expression, lymphocyte expression, phagocytosis, and so on. The present review deals with wide variety of such plants responsible for safeguarding cattle health from every aspect.

Key words: Cattle health, Ethno-Veterinary, Herbal Medicine, Immunomodulation

Annals Ayurvedic Med. 2012 : 1 (4) 144-152

Introduction

Relationship between plants and animals has been continuing from time immemorial. They together flourish with the help and assistance of one another. This relationship was analysed finely after the evolution of human civilisation to a greater extent. In ancient time, hunting- gathering lifestyle was closely associated with wild animals and at the same time, plants were found in and around their close vicinity. Gradually, plants were used for their daily necessities like food, shelter, clothing and medicines. However, there is no authentic record of the veterinary use of plants in the ancient literature. Therefore, it is difficult to trace the ailments of animals. But, the *Rigveda* describes a lot regarding the close association of human beings with the plants for treatment of their kith and kin (*Ayurveda*) and their animals (*Mrigayurveda*) or today's Ethnoveterinary Medicine (EVM), the knowledge of which constitutes a relevant part of ethnobiological knowledge. ^[1] In true sense, it deals with people's knowledge, skills, methods, practices and beliefs about the care of their animals and to keep them

healthy, which are acquired through practical experience and has traditionally been passed down orally from generation to generation. ^[2] Since centuries before the introduction of western and allopathic medicines, all livestock keepers relied on these traditional practices. Even though data on veterinary plant uses are universally and significantly present in every general ethno botanical prospection and ethno pharmacological aspects, ^[3,4,5] but, due to lack of proper documentation, EVM is restricted to few Herbal Healers in our society.

Like the one well known 'Sanjeevani booti' described in Hindu mythology, herbs are also considered as God's gift to human beings in the form of natural medicines. India, which is said to have probably the oldest, richest and most diverse cultural traditions in the use of medicinal plants, stands second to China in production of medicinal herbs. About 7,500 species are used in ethno-medicines in the country, ^[6] which is half of the country's 17,000 Indian native plant species. ^[7] These innumerable treasures of medicinal herbs bring India the distinction of 'the botanical garden of the world'. The use of medicinal plants

in the treatment of diseases as well as for increasing the productivity of high yielding animal like cattle has generated renewed interest in recent times, as herbal preparations are increasingly being used in cattle healthcare practices.^[8,9] Those practices are still continuing in the minds of local people and the tribals, which have got greater accountability towards livestock management in our country. About 68.84 % (83.3 crores) people of India live in villages.^[10] Most of them depend on traditional or folk medicines or household remedies for the treatment of diseases from which they themselves or their domestic animals suffer from. In rural India and tribal societies, use of plants as veterinary medicines are very common and some sporadic reports from different parts of India are available on the use of plants for the treatment of animal diseases and this system of therapy is commonly referred as unani, folk, eastern, or indigenous medicine.^[11] Moreover, several medicinal plants used in Indian traditional medicine called Rasayanas which increases the resistance of the body against a variety of infections have attracted the attention of many scientists. It is one among the eight branches of Ayurveda which has been meant for nourishing and rejuvenating drugs with multiple applications for longevity, memory enhancement, immunomodulation and adaptogenic.^[12] However, most of the investigations are carried out independently without any significant interdisciplinary investigations and most importantly, the idea of sustainability in traditional herbal medicine can be well traced through different cultures and societies with different notions.^[13,14]

Traditional herbal healers

Rapid reduction in natural resources as a consequence to the expanded urbanization, global warming and reduced natural habitat posed a considerable threat to the sustainability of traditional medicine which is completely dependent upon herbs apart from minerals and animal products.^[15] Still then, traditional herbal healers are practicing in several parts of the world where large ethnic community live in. History reveals that most of the people of the world have been using plants, animals, micro - organisms and minerals for treating their illness. In last one decade, traditional herbal medicine has gained importance in various developed and developing countries including India.^[16,17]

The root and tuber decoction of *Asparagus racemosus* Willd (Shatavri), seed extract of *Cassia tora* Linn. (Charota) stem, bark decoction of *Bauhinia purpurea* Linn. (Kelor), the fermented whole plant of *Andrographis paniculata* or (Chireita), powder of the sun-dried whole plant of *Cuscuta reflexa* (Nirmuli) and water vapour from the boiled leaves and stem of *Cuscuta reflexa* Roxb. (Akashbeal) can be used for relieving fever, body pain and swellings. The paste of *Zingiber officinalis* Ross. (Dry Ginger), mucilage of leaves *Aloe barbadensis* Mill. (Ghrita Kanwar), paste prepared of *Santalum album* Linn. (Sandal wood) and leaves of *Vitex negunda* Linn. can be used for relieving headache. Paste of the roots, stem and leaves of the plants like *Bauhinia purpurea* (Linn.), *Solanum torvum* Swartz (Ringi) and *Curcuma angustifolia* Roxb. (Tikhur) can be used for healing of bone fracture. The paste prepared from rhizome of *A. calamus* Linn. (Safedbuch), stem and bark of *Buchnania lanzan* Spr. (Achar) shoot and leaves of *Bombax ceiba* Linn. (Semul) and *Moringa oleifera* Lamk. (Munga) can be applied on wounds in case of snake bite. Similarly, paste of the roots of *Cieba pentandra* (Linn.) Gratean (Kapok) shoot and leaves of *Achyranthus aspera* Linn. (Chirchita) and *Clemone Gynandra* Linn. (Hurhar) and seed oil of *Madhuca indica* Gmel (Maui) can be used for cure of wounds due to scorpion-sting.^[18]

Herbal plants used for the treatment of diseases, ailments and infections

The use of herbs and botanical extracts for antimicrobial property and immune enhancement has been practiced from very old days in nearly every culture across the globe.^[19] A number of plants, plant extracts and constituents have been identified as having anti-microbial, antiviral or antifungal activities and are often considered as immune enhancing.^[20]

The decoction prepared from the leaves of *Aegle marmelos* Correa (Rutaceae) or *Bela* along with leaves of *Datura metel*, paste prepared from the leaves of the plant *Cassia fistula* Linn. (Caesalpiniaceae) or *Sunari* along with leaves of banana (*Musa paradisiaca*) and bel (*Aegle marmelos*), boiled *Azadirachta indica* or neem leaves in Til oil or oil prepared from the whole plant of *Potentilla fulgens* can be applied to the joints of the foreleg of the cattle suffering from black quarter disease. Fresh

roots of *Hygrophila auriculata* (Schum) Heine. (Acanthaceae) or *Koilekha*, along with grasses are fed to the animal to get relief from chicken pox or small pox. Paste prepared from the leaves of *Nicotiana tabacum* (tobacco), decoction of the fruit *Terminalia chebula* or *Harida* or tar-like oil extracted from the pericarp of the fruit *Semecarpus anacardium* (Kalabhalia) can be applied on the hoofs of the cattle suffering from foot and mouth disease. Use of neem stick or juice of the plant *Pergularia daemia* (Uturuli) against glossitis, either bark decoction of *Adhatoda vasika* (Basanga) Nees. (Acanthaceae) and *Ocimum sanctum* leaves or flower decoction of *Calotropis procera* (Arakha) and *Vitex negundo* (Nirgundi) for cough, cold or fever, *Cucumis melo* for bloat and indigestion, *Pyrus pashia*, *Psidium guajava* (Pijuli), seeds of the plant *Trachyspermum ammi* or Juani and fresh ginger (*Zingiber officinale*), powdered leaves of *Terminalia arjuna* (Arjuna), *Syzygium cumini* (Jamu) and *Acacia catechu* (Khaira) for digestive disorder, diarrhoea and pterygium disease, *Annona squamosa* (Atta) against local infection or *Ziziphus mauritiana* (desi boradi) against skin disease are quite noteworthy. ^[21, 22]

Some of the important herbs that can be used for curing ailments and economically important diseases of cattle are listed in table 1.

The world is in the midst of an environmental crisis. Anthropogenic environmental damage in the last century was greater than in any previous century, one of the major concerns is the misuse of medicines, and the resulting immune depletion in people and animals. Many traditional medical systems have taught that appropriate adaptation by, and of, an effective defense system is the key to health and survival. Thus, it is recommended to give priority to a preventive rather than a curative approach to health care ^[23] through proper use of EVM.

Medicinal plants having broad spectrum pharmacological activities including anthelmintic properties

Helminthiasis is one of the most important animal diseases worldwide, inflicting heavy production losses in grazing animals. The plant kingdom is known to provide a rich source of botanical anthelmintics, antibacterials and insecticides. ^[24, 25] A number of medicinal plants have been used to treat parasitic infections in man and animals.

Caesalpinia crista (Karanjwa), *Melia azedarach* (Bakain), *Saussurea lappa*, *Moringa oleifera* (Sohanjna), *Trachelospermum jasminoides* (Zard chambeli), *Butea frondosa* (Dhak), *Fumaria parviora* (Shahterah), *Nigella sativa* (Kalonji), *Vernonia anthelmintica* (Kali-zeeri), *Embellia ribes* (Babrung), *Psoralea corylifolia* (Babchi), fruits of *Mallotus philippinensis* (Kamala), *Punica granatum* (Anar) or *Lagenaria siceraria* (Kaddoo), seeds of *Butea superba* (Leguminosae; palasata) or *Peganum harmala* (Harmal) can be used as anthelmintic. In addition, these plants have also been used to cure nervous problems, skin diseases, cough, rheumatism, chronic fever, eczema, dyspepsia and some of them possess cathartic, laxative, expectorant, diuretic, tonic, aphrodisiac, lithotropic, styptic, narcotic, analgesic and antispasmodic properties. ^[26]

Essential oils of *Boswellia serrata* (Burreaceae; kunder), *Cinnamomum tamala* (Lauraceae; tejpat), *Gardenia lucida* (Rubiaceae; dekamali), *Cyperus rotendus* (Cyperaceae; mutha), *Buddleia asiatica* (Loganiaceae; newarpati), *Chloroxylon swientenia* (Rutaceae; bhirra) and oleo-gum resin of *Commiphora mukul* (Buberaceae; guggal) have got better *in vitro* activity against earthworms, tapeworms and hookworms compared to that of piperazine phosphate and hexylresorcinol. The roots of *Morus alba* (Tut) are considered as an anthelmintic and vermifuge, whereas root bark and stem bark of this plant are reported to act as vermifuge and purgative. Leaves of *Kachka* (*Caesalpinia bonduc* (L.) Roxb.) can be helpful to cure animals suffering from worms. ^[27, 28]

Herbal acaricides

The ethno-veterinary and medical knowledge offers a range of herbs to be evaluated for their acaricidal properties. A number of reports are available on the effect of different extracts of plant material on tick species that act as vectors of various infectious diseases. In the entomology laboratory of Indian Veterinary Research Institute, the alcoholic extracts of sitaphal (*Annona squamosa*) and neem (*Azadirachta indica*) are being evaluated for their acaricidal property against different life stages of *H. a. anatolicum* and *B. microplus* and the initial results are highly encouraging. ^[29]

Herbal plants used in surgical and gynaecological complications and conditions

In case of bone fracture or severe sprains, the paste made from bark of *Bombax ceiba* Linn. (Bombaceae) or *Simuli* can be applied on the affected area externally and a bandage cloth may also be tied. Boiled roots of the plant *Triumfetta rhomboidea* (Zipto) can be used in case of surgical complication like yolk gall. Young leaves of *Bambusa bambos* or *Kanta Baunsa* along with green fodder and leaves of the plant *Momordica charantia* or *Kalara* mixed with salt can be fed to cattle after delivery for the easy removal of placenta.^[30, 31]

Use of medicinal plants for the management of bovine mastitis

The use of antimicrobials for a long period of time has triggered the development of multidrug resistance strains of several bacterial species. This results in the use of higher dose of antimicrobials, causing the danger of increasing amounts of drug residues in milk that causes a potential biohazard.^[32] Thus, the use of medicinal plants may present a cheaper and sustainable alternative to synthetic medicines. Several different plant species have been documented for the treatment and prophylaxis of mastitis in cattle. The most frequently reported plant species are *Capsicum annuum*, *Lepidium sativum*, *Allium sativum*, *Sesamum indicum*, *Citrus limon*, *Zingiber officinale*, *Citrullus colocynthis*, *Curcuma longa*, *Amomum subulatum*, *Sesamum indicum*, *Cuminum cyminum*, *Rosa indica*, *Centratherum anthelmisticum*, *Triticum aestivum*, *Nigella sativa* and *Peganum harmala*.^[33] Commonly used vehicles for administration of plant materials of this type include water, jaggery, wheat flour, milk whey, butter as such or in refined form (*desi ghee*), sugar, vegetable oil, common and black salt. Sometimes, cow milk itself is used as a vehicle for the administration of fruit of *Amomum subulatum* and leaves of *Rosa indica*. Similarly, saltish milk whey can be mixed in oil extract of *Sesamum indicum* in treating mastitis. It has been suggested that the use of such vehicles may dilute or reduce the relative potency of the drug.^[34] Moreover, it has also been found that methanol extracts of plants like *Asteracantha longifolia* (Kokilaksha) and *Dactyloctenium indicum* has got *in vitro* antimicrobial activity against bovine mastitis pathogens like *Staph. aureus* and *E. coli*.^[35]

The information about important medicinal plants for healthcare in cattle especially in the north-eastern region

of our country along with their uses has been compiled in Table 2.

Uses of herbal plants and ethno-veterinary medicine for the purpose of immunomodulation and therapeutics

Immune enhancing activities

Modulation of immune response to alleviate diseases has long since been of interest. Herbal medicines have always been a form of therapy for livestock among resource poor marginal farmers.^[36] Recently, there has been progress on the ethnomedicinal plants as immunomodulatory agents because of the fact that plant extracts have been widely investigated during last few decades in different parts of the world for their possible immunomodulatory properties. In due course, several studies have demonstrated the isolation of potential bioactive molecule. Few have been tested as herbal formulations. Several plant extracts, compounds and formulations have also been patented.^[37]

Several botanicals are found to have immune enhancing activity, demonstrated from time to time. *C. versicolor* extracts are known to be rich in active ingredient like glucans. Emerging evidence indicates that herbal plants exert their beneficial effects on animal immune system mostly by plant secondary metabolites. The immunostimulating activities of many of these components have been most widely studied in mouse, chicken and human cell lines. For example, Ginseng with its steroidal saponine, has immune-stimulating properties including cytokine production (IL-2, IL- 6, TNF – α and IFN – γ), macrophage activation and lymphocyte activity. Conversely, flavonoids and terpenes from *Ginko biloba* can mediate production and inflammatory cytokines. Saponins have ability to stimulate the cell-mediated immune system, as well as to enhance the antibody production. Saponins reportedly induce the production of cytokines such as interleukins and interferons. Meyer saponins, Quillaja saponins and the butanol extract of *Lonicera japonica* and de-acetylated saponin-1 administered on the nasal mucosa all stimulate the immune response *in vivo*. Herbal plant polysaccharides, also has been extensively studied for immunomodulatory effects. The polysaccharides obtained from four Chinese herbs,

Astragalus root, *Isatis* root, *Achyranthes* root and Chinese Yam, considerably improves the antibody titre. ^[38]

Non-Infectious Diseases and disorders

Nelumbo lucifera Gaertn (*Nymphaeaceae*) is a well-known aquatic plant which has been used for the treatment of several disorders including skin disease, cough, inflammation, fever etc. ^[39]

Anti-cancer

Several herbal preparations are proved to boost up the immune system and make the body to defend against future or existing cancer. Some of the Indian herbs with anti-tumor property are *Echinacea*, *Aloe vera*, Tulsi, Turmeric, Satavar, Garlic etc. Another unique anticancer herb is green tea which contains tumor growth inhibiting factors as well as other polyphenols, vitamin C, carotene, fluoride, zinc, selenium, manganese, potassium, niacin and folic acid. Chinese medicine also reveals various anticancerous herbal preparations which are gaining attention nowadays. ^[40] Apart from the herbal preparations mentioned still now, it has also been seen that black pepper and cardamom aqueous extracts significantly enhance spleenocyte proliferation in a dose-dependent, synergistic fashion. Moreover, in Chinese medicine, the anti-cancer activity of a mushroom called Ling Zhi which contains triterpene as the active ingredient has been evaluated by researchers to have cytotoxic effect due to alteration of proteins involved in cell proliferation and / or cell death, carcinogenesis, oxidative stress, calcium signalling and ER stress. ^[41, 42]

Conclusions

Ethno-veterinary and herbal medicinal products ideally have multiple effects and are helpful in a variety of disease conditions as well as for beneficial effects on health of domestic animals like cattle. When considering on a global basis, the use of plant products has a traditional history not only in India but in almost all ancient civilizations including Chinese, Arab and American. Historical knowledge from the great traditions like Ayurveda and others will have an important role in bioprospecting, such as, drug discovery, utilizing traditional knowledge of herbs, medicinal plants and indigenously well known drugs being used since ancient times. Integration of modern medicine, traditional knowledge and use of

science and technologies with a systems biology approach can be most suitable in this regard. Moreover, plants of ethno-veterinary importance and herbal preparations need to be popularized for their wide application and acceptance, for which promotional approaches need attention so that their full potential can be utilized for safeguarding cattle health.

References

1. Wanzala W, Zessin KH, Kyule NM, Baumann MPO, Mathias E, Hassanali A. Ethnoveterinary medicine: a critical review of its evolution, perception, understanding and the way forward. *Livestock Research on Rural Development* 2005; 17(11): 55 78.
2. Toyang NJ, Wanyama J, Nuwanyakpa M, Django, S. Ethno-veterinary medicine: a practical approach for the treatment of cattle diseases in sub-Saharan Africa 2007; pp 87. www.agriculturesnetwork.org.
3. Rigat M, Bonet M A , Garcia S, Garnatje T, and Vallrs J, "Ethnobotany of food plants in the high river Ter valley (Pyrenees, Catalonia, Iberian Peninsula): non-crop food vascular plants and crop food plants with medicinal properties," *Ecology of Food and Nutrition*, vol. 48, no. 4, pp. 303–326, 2009. View at Publisher · View at Google Scholar · View at Scopus
4. Ghosh C, Das AP. Plants of ethno botanical significance for the tea garden workers in Terai and Duars of Darjeeling in West Bengal, India. In: Das AP, Pandey AK. (Eds.), *Advances in Ethno botany*, Dehra Dun, India 2007; pp. 133–147.
5. Pieroni A. People and plants in Lush: traditional medicine, local foods and post-communism in a northern Albanian village. In: Pardo-de-Santayana M, Pieroni A, Puri, RK. (Eds.), *Ethno botany in the new Europe, People, health and wild plant resources*, Berghahn Books, Oxford, UK, 2010; pp. 16–50.
6. Shankar D, Majumdar B. Beyond the Biodiversity Convention: the challenge facing the biocultural heritage of India's medicinal plants. In: Bodeker G, Bhat KKS, Burley J, Vantomme P. (Eds.), *Medicinal plants for forest conservation and health care*, Non

- wood Forest Products 11, FAO, Rome 1997; pp. 87-99.
7. Schippmann U. Medicinal plants significant trade study. In: CITES project S-109, Plants Committee Document PC9 9.1.3. (Rev.), BfN-Skripten 39. Federal Agency for Nature Conservation, Bonn 2001.
8. Wanzala W, Zessin KH, Kyule NM, Baumann MPO, Mathias E, Hassanali A. Ethnoveterinary medicine: a critical review of its evolution, perception, understanding and the way forward. *Livestock Research for Rural Development* 2005; 17(11).
9. Gonzrlez JA, Garcha-Barriuso M. and Amich F. Ethnoveterinary medicine in the Arribes del Duero, western Spain. *Veterinary Research Communications* 2011; 35(5): 283–310.
10. Chandramouli C. Rural urban distribution of population (Provisional population Totals). Census of India, 2011.
11. Das PK. Ethnoveterinary practices for cattle diseases in Ganjam district of Orissa, India. *Life Sciences Leaflets* 2011; 18: 700-06.
12. Patwardhan B, Gautam, M. Botanical immunodrugs: scope and opportunities. *Drug discovery today* 2005; 10: 495-502.
13. Wanzala W, Zessin KH, Kyule NM, Baumann MPO, Mathias E, Hassanali A. Ethnoveterinary medicine: a critical review of its evolution, perception, understanding and the way forward. *Livestock Research for Rural Development* 2005; 17(11).
14. Azaizeh H, Saad B, Cooper E, Said O. Traditional Arabic and Islamic medicine, a re-emerging health aid. *Evidence-Based Complementary and Alternative Medicine* 2010; 7(4): 419-424.
15. Rastogi S, Kaphle K. Sustainable Traditional Medicine: Taking the Inspirations from Ancient Veterinary Science. *Evidence-Based Complementary and Alternative Medicine* 2011; 2011: 1-6. doi: 10.1093/ecam/nen071.
16. WHO Collaborating Centres for Traditional Medicine. 1996. www.who.int/mediacentre/factsheets/fs134/en.
17. Rigat M, Bonet MA, Garcia S, Garnatje T, Vallrs J. Ethnobotany of food plants in the high river Ter valley (Pyrenees, Catalonia, Iberian Peninsula): non-crop food vascular plants and crop food plants with medicinal properties. *Ecology of Food and Nutrition* 2009; 48(4): 303–26.
18. Jacobs JL, Dixon J, Gabel M, Bergmann D, DeCory J, Geffre C. Antimicrobial screening on fourteen traditional American Indian medicinal plants. College of Arts and Sciences, Black Hills State University, Spearfish, SD, USA. *Proceedings of the South Dakota Academy of Science* 2010; 89: 85-93. Publisher: South Dakota Academy of Science, CODEN: PSDAA2 ISSN: 0096-378X.
19. Roxas M, Jurenka, J. Colds and influenza: a review of diagnosis and conventional, botanical, and nutritional considerations. *Alternative Medicine Review* 2007; 12(1): 25-48.
20. Rios JL, Recio MC. Medicinal plants and antimicrobial activity. *Journal of Ethnopharmacology* 2005; 100(1 2): 80-84.
21. Pala NA, Negi AK, Todaria NP. Traditional uses of medicinal plants of Pauri, Garhwal, Uttarakhand. *Nature Science* 2010; 8(6): 57-61.
22. Ragupathy S, Steven NG, Maruthakkutti M, Velusamy B, Ul-Huda MM. Consensus of the ‘Malasars’ traditional aboriginal knowledge of medicinal plants in the Velliangiri holy hills, India. *Journal of Ethnobiology and Ethnomedicine* 2008; 4(8).
23. Lin JH, Kaphle K, Wu LS, Yang NYJ, Lu G, Yu C, Yamada H, Rogers PAM. Sustainable veterinary medicine for the new era. *Revue Scientifique et Technique de l’OIE*. 2003; 22(3): 949-64.
24. Akerreta S, Calvo MI, Cavero RY. Ethnoveterinary knowledge in Navarra (Iberian Peninsula). *Journal of Ethnopharmacology* 2010; 130(2): 369–78.
25. Benhtez G, Gonzrlez-Tejero MR, Molero-Mesa J. Knowledge of ethnoveterinary medicine in the Province of Granada, Andalusia, Spain. *Journal of Ethnopharmacology* 2012; 139(2): 429–39.

26. Wynn GS. Herbs in Veterinary Medicine. *Alternative Veterinary Medicine* 2001; <http://www.altvetmed.com/articles/herbs.html>.
27. Mathias E. Ethnoveterinary medicine: harnessing its potential. *Veterinary Bulletin* 2004; 74(8): 27N - 37N.
28. Akhtar MS, Iqbal Z, Khan MN, Lateef, M. Anthelmintic activity of medicinal plants with particular reference to their use in animals in the Indo Pakistan subcontinent. *Small Ruminant Research* 2000; 38: 99-107.
29. Ghosh S, Azhahianambi P, Yadav MP. Upcoming and future strategies of tick control: a review. *Journal Vector Borne*. 2007; 44: 79-89.
30. Report published in Gujarat Innovates. pp. 69. www.nif.org.in/dwn.../Gujarat/PART-II.
31. Martin M, McCorkle MC, Mathias E. Ethnoveterinary Medicine. An annotated bibliography of community animal healthcare. ITDG Publishing, London, 2001; pp. 611. ISBN: 1853395226.
32. Chockalingam A, Zarlenga DS, Bannerman DD. Antimicrobial activity of bovine bactericidal permeability-increasing protein-derived peptides against gram-negative bacteria isolated from the milk of cows with clinical mastitis. *American Journal of Veterinary Research* 2007; 68(11): 1151-59.
33. Dilshad SMR, Rehman NU, Ahmad N, Iqbal A. Documentation of ethnoveterinary practices for mastitis in dairy animals in Pakistan. *Pakistan Veterinary Journal* 2009; 30(3): 167-71.
34. Jabbar A, Raza MA, Iqbal Z, Khan MN. An inventory of the ethnobotanicals used as anthelmintics in the Southern Punjab (Pakistan). *Journal of Ethnopharmacology* 2006; 108: 152-54.
35. Mubarack HM, Doss A, Dhanabalan R, Venkataswamy R. In-vitro antimicrobial effects of some selected plants against bovine mastitis pathogens. *Hygeia Journal of Dental Medicine* 2011; 3(1): 71-5.
36. Mirzaei-Aghsaghali A. Importance of medical herbs in animal feeding: A review. *Annals of Biological Research* 2012; 3(2): 918-23.
37. Carrio, E., Rigat M, Garnatje T, Mayans M, Parada, M, Valles, J. Plant Ethno-veterinary Practices in Two Pyrenean Territories of Catalonia (Iberian Peninsula) and in Two Areas of the Balearic Islands and Comparison with Ethno-botanical Uses in Human Medicine. *Evidence-based Complementary and Alternative Medicine* 2012; 2012: 1-22. Article ID 896295, doi:10.1155/2012/896295.
38. Hashemi SR, Davoodi H. Herbal plants as new immuno-stimulator in poultry industry: A review. *Asian Journal of Animal and Veterinary Advances* 2012; 7(2): 105-16.
39. Mukherjee D, Khatua TN, Venkatesh P, Saha BP, Mukherjee PK. Immunomodulatory potential of rhizome and seed extracts of *Nelumbo nucifera* Gaertn. *Journal of Ethnopharmacology* 2010; 128(2): 490-94.
40. Efferth T, Li PCH, Konkimalla VSB, Kaina B. From traditional Chinese medicine to rational cancer therapy. *Trends in Molecular Medicine* 2007; 13(8): 353-61.
41. Majdalawieh AF, Carr RI. *In vitro* investigation of the potential immunomodulatory and anti-cancer activities of black pepper (*Piper nigrum*) and cardamom (*Elettaria cardamomum*). *Journal of Medicinal Food*. 2010; 13(2): 371-81.
42. Yue QX, Song XY, Ma C, Feng LX, Guan SH, Wu WY. Effects of triterpenes from *Ganoderma lucidum* on protein expression profile of HeLa cells. *Phytomedica* 2010; 17: 606-13.

Source of Support: None
Conflict of Interest: Nil

Table 1 : Herbs used for ailments and economically important diseases of cattle in India

S. No.	Binomial and local name	Parts used	Indication
1.	<i>Asparagus racemosus</i> (Shatavari)	Root and tuber	Fever
2.	<i>Andrographis paniculata</i> (Chireita)	Whole plant	Fever
3.	<i>Cuscuta reflexa</i> (Akashbeal)	Leaves and stem	Fever, body pain and swelling
4.	<i>Zingiber officianilis</i> (Dry Ginger)	Tuber	Headache
5.	<i>Aloe barbadensis</i> (Ghrita Kanwar)	Leaves	Headache
6.	<i>Adhatoda vasika</i> (Basanga)	Bark	Cough and cold
7.	<i>Calotropis procera</i> (Arakha)	Flowers	Cough and Cold
8.	<i>Psidium guajava</i> (Pijuli)	Fresh leaves	Diarrhoea
9.	<i>Acacia catechu</i> (Khaira)	Leaves	Diarrhoea
10.	<i>Cassia fistula</i> (Sunari)	Leaves	Black quarter
11.	<i>Musa paradisiaca</i> (Banana)	Leaves	Black Quarter
12.	<i>Aegle marmelos</i> (Bel)	Leaves	Black Quarter
13.	<i>Hygrophila auriculata</i> (Koilekha)	Roots	Chicken pox/Small pox
14.	<i>Nicotiana tabacum</i> (Tobacco)	Leaves	Foot-and-mouth disease
15.	<i>Terminalia chebula</i> (Harida)	Fruit	Foot and Mouth Disease
16.	<i>Semecarpus anacardium</i> (Kalabhalla)	Pericarp of the fruit	Foot and Mouth Disease
17.	<i>Pyrus pashia</i>	Fruit	Pterygium disease
18.	<i>Amomum subulatum</i>	Fruit	Mastitis
19.	<i>Rosa indica</i>	Leaves	Mastitis
20.	<i>Asteracantha longifolia</i> (Kokilaksha)	Methanol extracts	Bovine mastitis caused by <i>Staph. aureus</i> and <i>E. coli</i>

Table 2: Important medicinal plants for healthcare in cattle in the north-eastern region

S. No.	Binomial name	Local name	Uses
1.	<i>Annona squamosa</i>	Atlas	Leaf juice is used to kill ectoparasite.
2.	<i>Allium cepa</i>	Piyaj	Bulb paste is applied in insect bites to relieve pain.
3.	<i>Allium sativa</i>	Naharu	Paste of garlic bulb and ginger rhizome in equal parts is given in indigestion.
4.	<i>Brassica nigra</i>	Kola sariah	Pure mustard oil with rhizome paste of <i>Curcuma longa</i> is applied on the mischief part of cattle horn.

Chakraborty S, Pal S K : Plants for Cattle Health

5.	<i>Capsicum frutescens</i>	Khud-jalakia	Paste of ripe fruits mixed with mustard oil is applied to boils.
6.	<i>Citrus aurintifolia</i>	Narang-ashi	About 10gm fruit, preserved in common salt for 3-4 yrs, is given during discharge of mucus in the faeces.
7.	<i>Christella parasiticus</i>	Bih-lagani	Leaf paste is applied to relieve pain and in snake bite.
8.	<i>Cucumis sativus</i>	Tiyah	Fruit paste is given to expel accidentally swallowed leech from the stomach.
9.	<i>Curcuma angustifolia</i>	Gorusat haladhi	Rhizome paste is applied to stop bleeding of cattle injured by leech.
10.	<i>Curcuma caesia</i>	Kola haladhi	Fresh rhizome juice mixed with mustard oil is given once daily on empty stomach for 2-3 days for gout.
11.	<i>Cynodon dactylon</i>	Dubari-ban	Plant juice is given twice or thrice daily for a week to cure haematuria.
12.	<i>Datura metel</i>	Dhatura	Tender leaf juice mixed with sugar and water is given once daily for two days to prevent rabies. The dose varies according to the age of cattle.
13.	<i>Ficus hispida</i>	Dimoru	Leaves with common salt are rubbed on tongue to cure sore of cow and bullock.
14.	<i>Hibiscus subdariffa</i>	Ranga tengamara	Leaf juice is given once daily empty stomach for 3-4 days in dysentery.
15.	<i>Paederia scandens</i>	Bhedilata	Leaf juice is given once daily empty stomach for a fortnight in splenomegaly of cattle.
16.	<i>Phaseolus mungo</i>	Matimah	Seed soaked in water with equal amount of <i>Curcuma angustifolia</i> Roxb, rhizome made into poultice and mixed with mustard oil and applied in skin diseases in cattle.
17.	<i>Piper nigrum</i>	Jaluk	Powder of dried fruits with water is applied immediately to relieve pain of insect bites.
18.	<i>Polygonum strigosum</i>	Mou-sarali	Tender roasted shoots are given once daily on empty stomach for 2-3 days in dysentery of cattle.
19.	<i>Prunus domestica</i>	Ahom-bagari	Paste of leaves with a naphthalene ball is applied on maggot infected wounds of cattle to kill the worms and to heal the wounds once daily for 2-3 days until cured.
20.	<i>Saccharum officinarum</i>	Kuhia	Leaves are given to hasten placental discharge of cow following delivery.
