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Plant based ethno-veterinary medicine used by farmers in Udupi District of Karnataka

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Abstract
The review on scientific rationale behind the people`s Indigenous Technical Knowledge (ITK) practiced by farmers of Udupi district showed the striking relevance for the sustainence in farming system. Perusal of the technologies listed indicated that the close observation of the nature and the experience in interaction with its components were largely responsible for their evolution. Low cost, simplicity and affordability made the technologies more popular and practical. The influence of ethnobotanical knowledge in crop management, plant protection and animal health, mitigation of natures fury in storage practices and immediate requirements for simplicity, manoeuvrable and handy farm implements were the main reasons for the general acceptance. It is observed that instead of singal drug local people of this region used combined formulations of medicinal plants. Because they believe that the combined formulation is more powerful than singal plant or mixture. In the present formulation 19 plants species were used with 7 other ingredients. Etnobotanical knowledge for curing the ailment of cattle was evident. The rationale was also supported with the scientific relevance. However, the validation of dosage need to be made before the acceptance.

Keywords: ITK, Ethnoveterinary medicinal plants

Introduction
Indigenous Technical Knowledge (ITK) is the knowledge that has been developed over time in a community mainly through accumulation of experiences and intimate understanding of the environment in a given culture. Indigenous knowledge need to be recorded and can be of good use to devise innovative research for agricultural researchers, extension workers, development practioners, and environmentalists for sustainable agriculture development and management of natural resources. Understanding Indigenous Knowledge in agriculture helps to ensure that farming practices will not cause so much plant genetic erosion and environmental erosion. In fact it should cater for sustainable food security and conservation of the variety and variability of animals, plants and very vital soil properties such as physical, biological and chemical properties. Conservation of natural resources depends on human beings and their interaction with the environment which is very much related to the Indigenous knowledge that has been communicated and passed down from generation to generation through family members and communities.

Ethnoveterinary medicine often provides cheaper options than comparable western drugs and the products are locally available and more easily accessible. In the face of these and other factors, there is increasing interest in the field of ethnoveterinary research and development. Some studies on ethno veterinary practices from different regions of India have been reported but there is no such studies are available for Karnataka except a few studies in the last decade. In view of this, the present study was conducted to identify, collect and document the ethnoveterinary medicinal plants used by farmers of Udupi district and their utilization for primary health care of animals in treatments of different ailments.

Methodology
The present study was conducted in 2016-17 in organic villages of Udupi and Karkala taluks in Udupi district of coastal Karnataka. Udupi and Karkala taluks is an important district of Karnataka which has picturesque landscapes dotted with hillocks, lakes, temples and forts etc. The present study was conducted in six villages, which are located very close to forest area of Western Ghats hills of Udupi district. The people of the study area are basically agriculturists and most of them are having domestic animals such as cow and buffalo.

But the area has not been supported by the veterinary, hospitals and any such dispensaries. The villagers in the district are usually going to the nearby hobli place of the taluk to treat their animals. In case of emergency the ethno veterinary healers of the study area offer some necessary indigenous treatments with medicinal plants.

The Focussed Group Discussion method was followed to gather indigenous technical knowledge from the farmers. The villagers were asked to deliberate on their skills passed onto them by their elders in tackling the different problems in agricultural enterprises that were deemed to be the best practices with practical relevance even for the day. Care was taken to confirm that the deliberations were not influenced by the scientific findings of any of the institutions. The presented practices were also confirmed with the follow up field survey and personal interactions with the villagers.

Results

The local and botanical names of the medicinal plants followed by the diseases, ingredients preparation and administer or application were given in Table 1.

It is observed that instead of singal drug, local people of this region used combined formulations of medicinal plants. Because they believe that the combined formulation is more powerful than singal plant or mixture. In the present formulation 19 plants species used with 7 other ingredients. They are Black pepper, Mangana balli, Kodasana togate, Garlic, Jeerige, Chilli, Onion, Ginger, Wild ginger, Anemoogina thogate, Vante huli, Jaggery, ROXB, Lakki, Tumbe leaves, Salt, Basale leaves, White rice, Sour butter milk, Asafetida, Fenugreek seeds, Lime, Mimosa, Rice bran, hot water and Arecanut fronds. Different plant parts were used for treatment of the animal. In general leaves were highly used followed by fruits, roots, flowers, seeds, whole plant and stem. In majority of the cases herbal drugs were prepared in the form of as juice, decoction, paste and powder.

Table 1: The Etnoveterinary medicinal plants used by the farmers

S. No.	Local and Botanical name	Control of Diseases/cured	Method of preparation and application
1	1. Black pepper *(Piper nigrum)* 2. Mangana balli *(Tinospora malabarica)* 3. Kodasana togate (*Cleistanthus collinus)* 4. Garlic (*Allium sativum)* 5. Jeerige (*Cuminum cyminum)* 6. Chilli (*Capsicum annuam)* 7. Onion *(Allium cepa)* 8. Ginger (*Zingiber officinale)* 9. Wild ginger *(Alpinia pahangensis)* 10. Anemoogina thogate *(Oroxylum indicum L.)* 11. Vante huli (*Artocarpus lakoocha)* 12. Jaggery 13. ROXB *(Cleistanthus collinus)*	Cough, fever, cold, gastric and other diseases in cows	Feeding of the decoction is prepared by the grind all mixture with equal proportion of water
2	1. Lakki *(Vitex negundo)* 2. Tumbe leaves (*Leucas aspera*) 3. Salt 4. Jeerige (*Cuminum cyminum* L.) 5. Black pepper (*Piper nigrum*)	Reduces the infestation of worms in the animal hooves.	Grind ingredients and feed the mixture along with water
3	1. Basale leaves (*Basella alba*) 2. White rice	Smearing it on the udder reduces the mastraities	Apply the paste in equal proportions on udder
4	1. Sour butter milk 2. Asafetida (*Ferula asafoetida*)	Reduces the gastric problems and worms	Grind ingredients and feed the mixture
5	Fenugreek seeds (*Foenum graecum* L.)	Reduces ticks infestation	Administering the grind extract of 100g seeds with 2 liter of water to animals
6	Cleaning of animal sheds with lime	Reduces the mastitis but also the mosquito menace.	Application of lime on walls
7	1. Jiggery 2. Onion (*Allium cepa)* 3. Ginger	Against fever and cold and increased the digestion capacity of animals.	Grind ingredients and feed the mixture
8	Sour buttermilk and tulsi leaves	Effective against calf worms and digestion problems	Grind ingredients and feed the mixture
9	Turmeric and fenugreek	Reduces the tick infestation	Grind ingredients and feed the mixture as ganji
10	1. Mimosa *(Mimosa pudica)* plants 2. Rice bran	Effective during animal pregnancy	Grind ingredients and feed the mixture
11	Hot water for calves	1. Reduced the respiratory disorders in calves	2. Administering on body
12	1. Vegetables 2. Mimosa plant *(*Mimosa *pudica)*	To enhance the milk yield	Feed the mixture

13	1. Arecanut fronds 2. Azolla 3. Jeerige 4. Jaggery	To enhance the milk yield	Grind all ingredients and feed the mixture

Discussion

The plant species reported in the present study were cross checked with avliable literatures. Some of the plant spceis mentioned in the present study recorded earlier. The chemical compounds in the *Piper nigrum* was reported to contain bioactive compounds like piperine, pellitorine, guineensine, pipnoohine, trichostachine and piperonal. *Tinospora malabarica* was said to contain phytoconstituents viz. Alkaloid, Steroid, Cardiac Glycoside & Saponin Glycoside, Tannin & Phenolic compound. *Cleistanthus collinus* (ROXB.) was found to contain Ellagic acid with anti-inflammatory and antinociceptive properties. *Allium sativum* was identified as a beneficial hypolipidemic and antiatherosclerotic agent. *Cuminum cyminum* was said to contain cuminaldehyde, limonene, α- and β-pinene, 1,8-cineole, *o*- and *p*-cymene, α- and γ-terpinene, safranal and linalool. Major components of *Capsicum annuam* were capsaicin, dihydrocapsaicin and nonivamide (pelargonic acid vanillylamide). Biological activities of *Allium cepa* was mainly due to the thiosulfinates, volatile sulfur compounds present in it.

The major compounds identified in *Zingiber Officinale* were α Gingiberene and β Seiquphellandrene, α Curcumen, Cyclo Hexane, α Fernesene, Cis-6-Shagole, Gingerol and Gingerol. The major components of the *Alpinia pahangensis* rhizome oil were γ-selinene, β-pinene, (E,E)-farnesyl acetate and α-terpineol, while those of the leaf oil were β-pinene, α-pinene and limonene. The investigation of the antimicrobial activity of the essential oils revealed that the rhizome oil inhibited five Staphylococcus aureus strains and four selected fungi. Alkaloids, phenols, fats, lipids and waxes present in the roots and stems of *Oroxylum indicum* showed antimicrobial effects. Jaggery was reported to contain high nutritive and medicinal values. It was said to purify the blood, prevent the rheumatic afflictions and disorders of bile. Jaggery contained proteins, vitamins and minerals that were essential for the body. Flavonoids found in Artocarpus possessed strong antioxidation, anti-inflammation and antiplatelet aggregation. Tannins present in *Vitex negundo* L. were reported to have antifungal and antiviral activities, in addition to their insecticidal activities as noted against Spodoptera litura. Leucas aspera was said to contain triterpenoids, oleanolic acid, ursolic acid and b-sitosterol, nicotine, stereos, glucoside, diterpenes, phenolic compounds (4-(24-hydroxy-1-oxo-5-n-propyltetracosanyl-phenol).

Presence of high level cumin aldehyde, â-pinene, Limonene, geranyl acetate, eugenol, R-pinene, perillaldehyde and sabinene present in *Cuminum cyminum* L were said to be responsible for antimicrobial activity. Piperine, pellitorine, guineensine, pipnoohine, trichostachine and piperonal present in Piper nigrum were said to have bioactive compounds.

Antimicrobial activities were found to be exhibited by *Basella alba* against gram positive and gram negative bacteria and fungi. The leaf extracts showed significant *in vitro* anti-inflammatory and membrane stabilization effect by inhibiting hypotonicity induced lysis of erythrocyte membrane. Stabilization of lysosomal membrane was important in limiting the inflammatory response by preventing the release of lysosomal constituents of activated neutrophil such as bactericidal enzymes and proteases, which were said to cause further tissue inflammation and damage upon extracellular release.

Buttermilk was reported to have the highest emulsifying properties and the lowest foaming capacity due to a higher ratio of phospholipids to protein. Anti bacterial effect in *Ferula asafetida* was said to be due to alpha- pinene, alpha-erpineol, azulene, diallyl-disulfide, diallyl-sulfide, ferulic acid, luteolin, umbelliferone. Foenum-graecum (LINN.) was reported to contain alkaloids; choline and trigonelline. along with an insect repellent essential oil, Reduction in Gram-negative bacteria, Coliforms, Klebsiella spp and streptococci were reported by application of lime.

Alkaloid mimosine, mucilage and the tannins present in *Mimosa* pudica were reported to be used as anti-hyperglycemic, antidiarrhoeal and anti-convulsant. Rice bran was reported to contain high nutritional value with 12-15 per cent protein that was higher in lysine content than rice endosperm protein or any other cereal bran proteins. The protein efficiency ratio values for rice bran concentrates ranged from 2.0 to 2.5. Protein digestibility of rice bran was greater than 90 per cent and was considered a good source of hypoallergenic proteins. Appetite stimulation and dehydration correction were reported by providing calves with 1 gallon of warm water and electrolytes per 100 lbs. of body weight. Areca fronds were reported to contain Cellulose (43%), crude fiber (33%) and ash (5%).

Conclusion

Studies on medicinal plants conducted in Kodagu, Chikkamagalore, Shimoga, Uttrakannada, Mangalore and Udupi districts of Karnataka. However, in Udupi district also the studies were conduted on etnobotanical knowledge for curing the ailment of cattle was evident. Hence, the present study represents the contribution to the existing knowledge of the local people. The rationale was also supported with the scientific relevance. However, the validation of dosage need to be made before the acceptance.

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