Medicinal Plants Used in Bovine Ethnoveterinary in Minas Gerais State

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The phytotherapy has been restored by ethnoveterinary research with the aim to control bovine disturbs like treatment and control of mastitis and the endo and ecto parasites infestation. This work goal was to restore up the folk knowledge about the medicinal plants used in bovine therapeutics. In this work, 16 communities has been visited in Minas Gerais state: Alagoa, Carvalhos, Bocaina, Ibertioga, Santana do Garambéu, Santa Rita de Ibitipoca, Olaria, Lima Duarte, Pedro Teixeira and Bias Fortes. In each of them, key informant was selected and interviewed about the use of medicinal plants in veterinary clinic. The sample was composed of 37 local dairy farmers. The medicinal plants that have been more cited by the farmers were: *Leonurus sibiricus* L., *Psidium guajava* L., *Musa paradisiaca* L., *Ageratum conyzoides* L., *Citruslimon* (L.) Burm. f., *Baccharis trimera* (Less.) DC., *Nicotiana tabacum* L., *Ricinus comunis* L., *Stryphnodendron adstringens* (Mart.) Coville, *Stryphnodendron* aff *pulcherrimum* (Willd.) Hochr, *Polygonumhydropiperoides*Michaux and*Allium sativum* L.,Inflamations, mastitis, ectoparasites, diarrhea, retained placenta and hematuria were the most citeddisturbs. The species *L. sibiricus,Trimesia* sp., *P. guajava,A. conyzoides,Agave sisalana* Perrine, *Furcraea selloa* K. Koch, *Plantago australis* Lam.,*M. paradisiaca*, *Araucaria angustifolia* (Bertol.) Kuntzee *Copaifera langsdorffii* Desf.Were recommended for mastitis treatment. The antimicrobial activity of this species was researched by minimal inhibitory concentration (MIC) against *Staphylococcus aureus*, *Escherichia coli*, bacteria of the same species of mastitis etiological agents, beyond *Pseudomonas aeruginosa*, *Salmonella typhimurium*. Most of the extracts showed potential antimicrobial activity, especially the methanolic extract of leaves of *P. autralis*, which showed MIC of 125µg against *S. aureus* and 1000 µg against *E. coli*, besides showed MIC de 500 µg against *P. aeruginosai* e *S. typhimurium*.

Key Words: Disease, Dairy cattle, Ethnoveterinary, Sustentability

INTRODUCTION

Much has been said and written about food quality and safety, which has increased the demand for food products free of toxic residues. With respect to milk, there is growing concern by consumers, producers, dairy companies and researchers about the production system and quality of this product. Among the various problems faced by dairy farmers, mastitis stands out in Brazil because it is responsible for production losses of some 12% to

15%. It is estimated that 50% of dairy cows in Brazil suffer from this problem in one or more mammary quarters. Interest in therapy with medicinal plants (phytotherapy) is becoming more widespread as a practical way to treat a wide array of diseases.Ironically, at the same time, the traditional knowledge about the use of medicinal plants, handed down from generation to generation, is in many cases at risk of being lost (Almeida, 1993). Research into ethnoveterinary practices seeks to rescue this important traditional knowledge (Gakuya et al., 2011; Martinez and Lujan, 2011 Deshmukh et al., 2011, Monteiro et al., 2011) and to apply it to control various diseases of farm animals, such as mastitis (Dilshad et al., 2010) and infestation by endo and ectoparasites (Wansala et al., 2012). There are various ways to obtain knowledge about the bioactivity of plants, but the study of their popular uses eases the task, reduces research costs and maintains the value of the regional plants. The present work is part of this effort, focusing on communities in the state of Minas Gerais and their knowledge of the use of medicinal plants to treat some cattle ailments.

MATERIALS AND METHODS

Key informants regarding the use of medicinal plants in veterinary treatment were selected and interviewed in each community in the period from June 2008 to January 2009. This selection was carried out by the office of the state agricultural extension agency (EMATER) in each municipality. A total of 37 dairy farmers were interviewed, the majority of them elderly, from 16 communities in 10 municipalities (Alagoa, Carvalhos, Bocaina, Ibertioga, Santana do Garambéu, Santa Rita de Ibitipoca, Olaria, Lima Duarte, Pedro Teixeira and Bias Fortes), all located in the region known as the Mantiqueira Ecological Corridor. The respondents were interviewed individually, by prior appointment and after signing informed consent forms. They were asked about the names of the plants, the parts used, method of preparation and toxicity, among other matters. Besides the routine written notes, when necessary photographs were taken and sound recordings were made. The respondents were asked to name the plants they used and the recipes from their informal knowledge, as learned from other people. Most of the interviews were conducted in the field, which facilitated the immediate collection of the plants mentioned. Samples were collected and identified as to species, and voucher specimens were deposited in the CESJ Herbarium (Universidade Federal de Juiz de Fora - UFJF). The identified plant specimenswere taken to the ICB Phytochemistry Laboratory of UFJF where they were dried at room temperature for preparation of the extracts. The organic extracts were obtained through extraction by static maceration with hexane and methanol until exhaustion. In turn, the aqueous extracts were prepared by infusion followed by lyophilization. The antibacterial activity was evaluated against the bacteria strains *Staphylococcus aureus* ATCC 29213 and *Escherichia coli* ATCC 10536. Bacteria of these species are etiological agents of mastitis. The activity against*Pseudomonas aeruginosa* ATCC 27853 and *Salmonella enterica subsp. enterica serovar Typhimurium* ATCC 13311 was also evaluated. The antibacterial activity was measured by the susceptibility assay through the broth microdilution method, as described by the National Committee for Clinical Laboratory Standards (NCCLS, 2002), with modifications. The lowest concentration of each

extract that inhibited microbial growth was expressed as the minimum inhibitory concentration (MIC). The stock solutions were diluted of 1000 µg/mLto 7.8 µg/mL and 80 µL of each was transferred to microplates that already contained 100 µL of Mueller-Hinton broth. Each well received20 µLof inoculum diluted in a 0.9% saline solution (according to the McFarland turbidity scale) and the MIC was expressed as the weakest dilution that completely inhibited growth of the strain tested. Chloramphenicol was used as positive control at concentrations of 100 to 0.78 µg/mL. All the tests were performed in triplicate.

RESULTS AND DISCUSSION

The 37 respondents mentioned 355 plants used to treat animals. The most often cited plants are listed in Table 1. According to the botanical families presented in Table 1, the chemical constituents expected for these plants are products of acetate pathway, and the plants that have the prevalence of shikimate pathway tend to tannin production, like in *Stryphnodendron adstringens*.

Table 1 Plants most often mentioned in a survey of ethnoveterinary practices in 10 municipalities of the Mantiqueira Ecological Corridor, Minas Gerais, Brazil, and their respective botanical family.

Popular name	Number of citations	Scientific name	Family
Macaé	19	*Leonuros sibiricus* L.	Lamiaceae
Goiaba	15	*Psidium guajava* L.	Myrtaceae
Banana	11	*Musa paradisiaca* L.	Musaceae
Erva de São João	11	*Ageratum conyzoides* L.	Asteraceae
Limão	11	*Citrus limon* (L.) Burn. f.	Rutaceae
Carqueja	10	*Baccharis trimera* (Lees.) DC.	Asteraceae
Fumo	10	*Nicotina tabacum* L.	Solanaceae
Mamona	9	*Ricinus communis* L.	Euphorbiaceae
Barbatimão	9	*Stryphnodendron adstringens* (Mart.) Coville, *S.* aff *pulcherrimum* (Willd.) Hochr.	Fabaceae
Alho	8	*Allium sativum* L.	Liliaceae

The most common preparation method was decoction, with the tea given orally. The respondents stated that these therapies are not customarily used these days, since the younger generations in their communities no longer have the habit of using plants to treat animals.Knowledge about medicinal plants for treatment of animals is thus becoming lost, as new generations lose the habit of using plants for veterinary therapy, increasing the risk of loss of these natural and self-sustainable resources.The same pattern has been reported in other ethnopharmacological studies (Pimenta & Pires, 2008). Even older farmers have shifted

away from this form of treatment and toward commercial products, and in some cases homeopathic ones. Besides this, the dependence on synthetic products increases vulnerability to the development of resistance by the pathogens that cause cattle ailments. The 20 plants most cited (Table 1) and/or considered most relevant were selected for the next phase, involving phytochemical fractionation and respective biomonitoring through *in vitro* tests to confirm the various activities of the mentioned plants. Four of the species shown in Table 1 – *Leonurus sibiricus* (macaé),*Psidium guajava* (goiaba),*Ageratum conyzoides* (erva de São João) and*Musa paradisiaca* (banana) –besides the species *Araucaria angustifolia* (pinheiro do Paraná),*Trimezia* sp. (pinhãozinho), *Agave sisalana* (sisal), *Furcraea selloa* (pita), *Plantago australis* (transagem) and*Copaifera langsdorffii* (copaíba), were indicated for treatment of mastitis. Therefore, their extracts were assessed by *in vitro* tests to confirm their antimicrobial action. All the extracts except the hexane extract of *L. sibiricus* root and the methanol extract of *L. sibiricus* rhizome showed action against one or more of the bacteria tested, with the standouts being the methanol extract of*Plantago australis* leaves, which was the most promising, with MICs of 125 µg against *S. aureus* and 1000 µg against*E. coli*, besides MIC of 500 µg against*P. aeruginosai* and*S. typhimurium*. All of the extracts of purple*A. conyzoides* and *P. guajava*, along with the methanol extracts of the leaves of *L. sibiricus*, *A. angustifolia* and white *A. conyzoides*, presented activity against the two etiological agents of mastitis tested, *S. aureus* and *E. coli*. The extracts that proved effective against both etiological agents of mastitis will be tested against these same bacteria, but this time isolated from mastitis infections, in the next phase of this study.

CONCLUSIONS

The results of this work point to the importance of rescuing traditional knowledge about the uses of medicinal plants, nowadays mainly limited to elder people, as younger generations lose interest. Besides this, even among elder community members the use of these plants is diminishing. However, the *in vitro*tests indicate the species analyzed have antimicrobial potential and can be used effectively by farmers. Further study can provide the scientific grounds for this popular knowledge, which is often lost due to lack of studies to support the effectiveness of medicinal plants and the breakdown of the oral knowledge transmission chain.

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