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# A REVIEW OF PLANTS USED IN ETHNOVETERINARY MEDICINE

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In this review, we summarize our current state of understanding therapeutic potential and immunomodulatory effects of different plants used in ethnoveterinary medicine. The use of drugs derived from plants dates back to antiquity, so that today herbal medicine is practised worldwide. The great number of plants has been used in traditional ethnoveterinary medicines in the prevention and treatment of milder forms of diseases, chronic diseases and recurrent infections. One of the possibilities for stimulation of the functions of immuno system is the application of herbal preparations which can incite the function of the effector defensive cells and emphasize their defensive capacities. Extracts from some plants possess immune-stimulating properties and are able to increase the specific and nonspecific resistence of the animal organism to pathogens and stress. One of the most promising alternatives to classical antibiotic treatment is the use of plants for enhancing host defence responses and as potential growth promoters. Botanical compounds exibit a number of beneficial therapeutic properties and also their usage is the importance for the animal welfare. This compounds have been used as repellents and antiparasitics, or to treat the gastrointestinal, respiratory, reproductive, urinary or nervous system. Many of herbs are useful in several body systems.

**Key words:** plants; ethnoveterinary medicines

## ПРЕГЛЕД НА РАСТЕНИЈА КОИ СЕ КОРИСТАТ ВО ЕТНОВЕТЕРИНАРНАТА МЕДИЦИНА

Во овој преглед ја сумираме нашата моментална состојба на разбирање на терапевтскиот потенцијал и имуномодулаторните ефекти на различните растенија кои се користат во етноветеринарната медицина. Употребата на лекови добиени од растенијата датира од античко време, така што денес хербалната медицина се практикува насекаде во светот. Голем број растенија се користат во традиционалната етноветеринарна медицина за превенција и третман на поблаги форми на болести, хронични болести и повторувачки инфекции. Една од можностите за стимулација на функциите на имуниот систем е апликација на растителни препарати кои можат да ја иницираат функцијата на ефекторните одбранбени клетки и да го зајакнат нивниот одбранбен капацитет. Екстрактите од некои растенија имаат имуностимулативни особини и се способни да ја зголемат специфичната и неспецифичната отпорност на животинскиот организам спрема патогените и стресот. Една од најветувачките алтернативи за класичниот антибиотски третман е употребата на растенија за зајакнување на одбранбениот одговор на организмот, но и како потенцијални промотори на растежот. Растителните смеси покажуваат бројни терапевтски особини, а нивната употреба е значајна и за благосостојбата на животните. Овие смеси се користени за заштита од паразити и како антипаразитици или за третман на гастроинтестиналниот, респираторниот, репродуктивниот, уринарниот или нервниот систем. Многу од растенијата се употребливи во различни системи на телото.

**Клучни зборови:** растенија; етноветеринарна медицина

## INTRODUCTION

Traditional folk veterinary medicine or ethnoveterinary medicine is being defined as a mode of identifying, use and integration of the local knowledgeses, related skills and custom procedures created by people for purpose of preserving health and welfare of working and productive animals

(Köhler-Rollefson and Bräunig, 1998). Ethnoveterinary medicine means prevention and curing of diseases by plants (phytotherapy), bee products (apitherapy), milk and dairy products, clay, rabbit fat and swine lard, as well as manual removing of *Ixodidae* from the body of animals and use of fly larvae in the cleaning of suppurated wounds. By lighting the fire on pasture and rubbing parts of some plants and ashes into the animal skin a repellent action against insects, the carriers of some diseases, is obtained (Kudi, 2003).

Phytotherapy is a treatment which alleviates and prevents the onset of diseases in humans and animals based on natural medicinal raw materials and vegetable preparations. The skill of curing by plants was developed by all nations where in conformity with the region in which they lived they had learned to use available plants. Phytoherapy is based on traditional use of medicinal and other plants on the basis of long-term human empiricism regardless whether the medicinal properties of a certain plant were scientifically conrmed or not. Nowadays however, by perforing chemical, pharmacological and toxicological research for a great number, but not for all phytoreparations, the content of medicinal matters has been defined accurately and approved clinically for their healing properties. Conventional veterinary and ethnoveterinary medicine, even by taking into account their heterogenosity, must act jointly to realize their shared goal which is the preservation of health and welfare of animals.

## *Phytotherapy during history*

The knowledge about plants and their use in nutrition and prophylactic and therapeutical purposes in humans and animals goes back far into the history what is evidenced by various sources in the form of written records, preserved monuments and original vegetable drugs. By using plants in the nutrition the man had noticed their medicinal properties.

First written records on medicinal drugs and their application in prevention and therapy of human and animal diseases were found during tomb excavations and on the walls of the temples of ancient civilisations. African, American, Arabian, Egyptian, European, Asian, Sumer and other cultures through the centuries had developed their own ways of application of medicinal and other plants in health care. Babylon-Assyryan cuneiform script on pharmacotherapy describes a great number of vegetable drugs used for medicinal purposes (belladonna, thorn apple, flax, cypress, cedarwood, fig tree, onion). Ancient Egyptian medicine was acquainted with different drugs and other useful plants (anise, senna, mulberry tree, sunflower, henbane, saffron, thyme, cinnamon and other), and the knowledge about their action had been written on medical papyruses. Ajurveda, a collection of veda or the "knowledge" of ancient India contains the descriptions of plants and their action, as well as principles of diagnoses and treatment of diseases. According to the memoirs of Pliny the Senior, the Romans had prepared the potion from stinking hellebore to eject the poison from the body, while the mistletoe which grows on the oak had been attributed to the greatest healing power. Old Slavs had known and used a great number of plants for treatment such as against fever they had used absinthe and centaury, as emetic means they had used stinking hellebore and wild ginger, as diuretics parsley and celery, and garlic as antihelmintic (Kišgeci, 2002; Kuštrak, 2005).

By the end of the eighteenth and beginning of the nineteenth century almost nothing was known about chemical composition of plants. Plants, their skin, seed, fruit, leaves and other organs, in prophylaxis and therapy of great number of diseases of different aethiology had been used based on long-term experience. By modern scientific research an active healing action was confirmed for a great number of plants used in traditional medicine. By the end of the last century, the four fifths of human population in the world used phytotherapy and other forms of folk medicine with the aim of prevention and treatment of human and animal diseases (Abelson, 1990; Alcorn, 1995).

## *The role of plants in preserving health and welfare of animals*

In animal health care, the use of plants as supporting therapy in preventive purposes or as a complete therapy has a huge potential regardless whether it is the question of individual or combined plant medicinal preparations which act synergistically. It is possible to direct medicinal action of plants into certain direction, to strenghten or alleviate their action by combining certain features of some plants and their preparations. In phytotherapy whole plants are used, then their parts – drugs with structure of s. organized drug (over-

ground and underground plant organs) and drugs without structure s. non-cell drug (milk juice, ether oil, wax, mucus, balsam), ingredients and preparations. Teas, decoctions, extracts (watery, alcohol, watery-alcohol, oily), tinctures, macerations, solutions, syrups, bathing soaps, creams, lotions, pills, tablets are prepared from medicinal and other plants. In veterinary medicine the use of some forms of plants is to a certain degree limited because of the absence of cooperation with the patient on one hand while on the other the forms intended exclusivelly to animals are not available currently.

Active principles of plants belong to the group of secondary metabolites created by metabolic modifications of products of primary metabolism (carbohydrates, aminoacids and fatty acids). Secondary plant metabolites are of very versatile chemical composition and different pharmacological action and they include heterosides, alcaloides, saponosides, terpenoides, tannins, flavonoides. Taxonomically related plants mostly produce chemically similar, but not the same metabolites, therefore their pharmacological effects are similar, but they cannot replace one another in prevention and treatment of human and animal diseases.

Phytotherapy is very intensively used in prophylactic purposes with the aim of treatment of milder forms of diseases, chronic diseases and recurrent infections as well as in organic livestock production. Phytotherapeuticals (plant extracts, essence, etc.) and homeopatic products (vegetable, animal and mineral substances) have advantage over synthetic-chemical veterinary preparations in organic livestock production in case they ensure positive therapeutic effects in animals (The Regulation on Organic Livestock Production Methods, 2002).

### *The role of plants in strengthening the organism resistance*

The most serious attention in animal health care is devoted to prevention of diseases based, among other things, on raising animals in accordance with their demands and needs in order to achieve maximum resistance towards diseases and protection against infections. The effects of application of vegetable preparations are mostly directed towards stimulating some organism functions and enhancing their defensive abilities. Vegetable drugs having an immunostimulating action are horsetail (*Equisetum arvense* L., Equisetaceae) (Štajner et al., 2009), ehinacea (*Echinacea angustifolia* DC, *Echinacea pallida* Nutt. and *Echinacea purpurea* L., Asteraceae) (Goel et al., 2002), mistletoe (*Viscum album* L., Loranthaceae) (Sengul et al., 2009) and other. *Maydis stigma* (dried cut stigmata of *Zea mays* L., Poaceae) displays an antioxidative activity (Maksimović and Kovačević, 2003; Maksimović et al., 2005a) and in traditional medicine it is used as a mild diuretic and urinary ointment which facilitates the passage of stones and gravel through kidneys and urinary bladder (Czygan, 1997; Maksimović et al., 2004). Although it belongs to poisonous plants a stinking hellebore (*Helleborus* L., Ranunculaceae) is used in ethnoveterinary medicine for cattle "herbal treatment" in Pek, Zvižd, Jarmenovci and Vojvodina (Đurić, 1985), in Macedonia (Stojkovski et al., 1999) and in Romania (Bogdan et al., 1990). A procedure of transcutaneous implantation of stinking hellebore rhizome in the ear of sheep and pigs, cattle necklace and horses chest skin is conducted with the aim of protection from diseases and parasites, acute stages of chronic illness, diminished appetite and to induce immuno response. Subcutaneous, intraperitoneal and intramuscular application of different concentrations of the extract of rhizome and root of *H.* odorus Walds et Kit, to the Wistar strain rats have led to expressed leukocytosis and neutrophilia, that is, activation of rapid, non-specific defensive mechanisms (Davidović et al., 2006a,b, 2007a) and poor haemolysis (Davidović et al., 2007b).

### *Antimicrobial activity of plants*

Over last decades a usual practice in livestock production was the use of antibiotics as growth promoters which were applied in doses smaller than therapeutical. Subtherapeutic doses of antibiotics destroy a great number of pathogens and promote the growth of useful microflora. The obtained effect is to prevent production of bacterial toxins with simultaneous reduction of food consumption and immuno stress because more nutritive ingredients are directed towards growth and production instead of to mechanisms for strenghtening the resistance of organism. According to the regulations of the Law on organic production in the Republic of Serbia (2002) in the nutrition of animals the use of antibiotics, coccidiostatics, bi-

ostimulators, hormones or any other matters by which the growth or production is stimulated was forbidden. In all European Union countries from the beginning of 2006 the use of antibiotics for prophylactic and stimulatory purposes in all fodder mixtures was forbidden. Recently the efforts of researchers have been directed towards finding alternatives for antibiotics (Mellor, 2000). By using nutritive supplements it is possible to induce food digestion (hydrolytical enzymes) and prevent the development of pathogenic microorganisms (plants extracts, organic acids, useful microorganisms) (Đorđević et al., 2006). In this way the quality of products (meat, milk, eggs) can also be improved. The use of vegetable preparations does not lead to the resistance of pathogenic microorganisms, there are no residues in the food and they are completely non-toxic. Aromatic herbs rich in ether oils have antimicrobial action, therefore following plants are used in ethnoveterinary medicine as natural disinfectants and antiseptics: chamomile (*Matricaria chamomilla* L., Asteraceae), sweet basil (*Ocimum basilicum* L., Lamiaceae), lemon balm (*Melissa officinalis* L., Lamiaceae), yarrow (*Achillea millefolium* L., Asteraceae). A significant bactericidal and fungicidal activity is displayed also by *Chenopodium botrys* L., Chenopodiaceae (Maksimović et al., 2005b) and *Ambrosia artemisiifolia* L., Asteraceae (Chalchat et al., 2004).

### *The effect of plants in the treatment of exo- and endoparasitoses*

White mugwort (*Artemisia absinthium* L., Asteraceae) and black mugwort (*Artemisia vulgaris* L., Asteraceae) had for centuries been used as anthelmintics (especially against oval and cylindrical worms) and in the treatment of animals infected by blood parasites (*Trypanosoma, Plasmodium* spp.), so by rubbing the ground fresh leaves mixed with lard into the cattle skin a repellent action on flies is achieved. Today these plants are used also in various disturbances of gastrointestinal tract, diminished secretion of digestive enzymes, disturbed creation and secretion of bile and for strenghtening of the organism. *Artemisia absinthium* L. is administered as food supplement to improve appetite and food digestion while boiled overground parts of this plant help young calves to digest cow`s milk (Guarrera, 1981). Because of its exceptionally strong action even small doses can cause coma or death in adult animals so dried plant material is used instead of ether oil. Decoction of the rhizome of genuine brachen s. Male Fern (*Dryopteris filix-mas* L., Aspidiaceae) is one of the strongest natural drugs against tapeworms (*Taenia saginata, Taenia solium*) and flukes (*Fasciola hepatica*). Filicin and filmarone in oil act toxically on worms, while oleorescin paralyzes their musculature and prevents parasites adhesion on bowels mucous membrane (Jarić et al., 2007). In some parts of our country a stinking hellebore (*Helleborus L.*, Ranunculaceae) cooked together with hellebore (*Veratrum album* L., Liliaceae) and tobacco (*Nicotiana tabacum* L., Solanaceae) is used in eradication of cattle lice infestation and mange. The water in which the hellebore rhizome was cooked, alone or in combination with stinking hellebore is used for sprinkling potato and destroying potato beetles (Mačukanović-Jocić and Blaženčić, 2000).

### *Treatment of gastrointestinal system by plants*

In the treatment of diseases of the digestive tract a great number of plants is used whose active principles include bitter substances (many Asteraceae), glucosides (for example salicine in *Salix alba* L., Salicaceae) essential oils and jelly (*Linum usitatissimum* L., Linaceae, *Malva sylvestris,* Malvaceae) (Viegi et al., 2003). In ethnomedicine the treatment of diarrhoea in ruminants means the use of the following plants such as plantain (*Plantago major* L., Plantaginaceae), marigold (*Calendula officinalis* L., Asteraceae), nettle (*Urtica dioica* L.*,* Urticaceae), marsh mallow (*Althea officinalis* L., Malvaceae), dill (*Anethum graveolens* L., Apiaceae), willow (*Salix alba* L., Salicaceae) (Lans et al., 2007). The seed of dock (*Rumex* sp., Polygonaceae) boiled in water is used for treatment of diarrhoea in pigs. Overground parts of the flowered Klamath weed (*Hypericum perforatum* L., Hypericaceae) boiled in water are administered as a drink to cattle and sheep if swelling occurs (Jarić et al., 2007).

### *Treatment of wounds and skin diseases by plants*

The juice obtained by crushing the sambucus leaves (*Sambucus ebulus* L, Sambucaceae) is applied directly at the place of the snake bite or a bee sting, and thanks to its antiinflamatory action the root and leaf of this plant are used in the treatment

of burns, inflammations, oedema, eczema and urticaria (Ebrahimzadeh et al., 2006). In some regions the place of snake bite is being thrashed by a dog rose branch (*Rosa canina* L., Rosaceae) in order to draw the poison out and infection of wounds after the bite of a wolf in cows and sheep is prevented by the compress made of cooked hellebore rhizome (*Veratrum album* L., Liliaceae) (Guarrera, 1994). In ethnoveterinary medicine the following plants having antiinflammatory and antiseptic action are used in healing of the wounds and they help forming of granular tissue and accelerate the wounds epithelization: yarrow (*Achilea millefolium* L., Asteraceae), marigold (*Calendula officinalis* L., Asteraceae) and aloe (*Aloe* sp., Liliaceae). The oily extract of Klamath weed (*Hypericum perforatum* L., Hypericaceae) is used externally in various skin and mucous membrane injuries and wounds as well as in burns.

## CONCLUSION

This research paper gives a review of the plants most frequently used in ethnoveterinary medicine, but the number of plant species which are successfully used in the prevention and treatment of animal diseases is far greater. Phytotherapy is one of the oldest and the most widely spread systems of therapy based on the use of plants regardless whether the healing properties of certain plants have been scientifically confirmed or not. Scientific findings on active ingredients, mechanisms of action and application of certain vegetable preparations are still incomplete, therefore it is necessary to intensify phytochemical, physiological and phytofarmacological research on insufficiently studied or less known plant species.

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