

The Traditional Knowledge About Herbal Use In Veterinary Medicine At The Balkan Peninsula

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Abstract

Background. The traditional knowledge about herbal use in veterinary medicine in Serbs is voluminous. However, that wealth is threatened to oblivion because new times give modern methods of treatment. Hence, the aim of this report was to present the collected data about folk methods of treatment and nutrition by the help of available plants related to the animals in Serbs what could be applied in up to date veterinary pharmacy.

Methods. The questionnaire of 28 questions was prepared regarding the breeding, nutrition and medical treatment of domestic animals as well as the herbal list of medicinal plants to use. The study is based on the "Show-and-Tell Technique" from the groups people without veterinary or medical education, with preference to people living in the remote settlements without resident veterinary services.

Results. Interviewed persons were in the age range of 30-90 years. Plant interviewee were asked to show the plant species in a fresh or dried condition (for adequate identification). The 1120 filled inquiry sheets were analysed. Ninety two herbs were presented, of whom the most frequent noted were *Carlina acaulis*, Asteraceae (6 times) and *Geum urbanum*, Rosaceae (5 times). The most frequent treated diseases were of digestive (47%) and pulmonary system (25%), skin (hair, hoof) (8%) and urinary system (7%). Among "other" category answers like "generally good for helath" are included.

Conclusion. It is still open question for the scientific branches of veterinary pharmacology to find out active ingredients, mechanism of action and application of some plants in the scope of veterinary pharmacology, phytochemistry and phytopharmacology. In that way the listed herbs in this work, which are still not in use nowadays, could be recognized as commercially available.

Introduction

Traditional folk veterinary medicine (ethnoveterinary medicine) might be defined as a mode of identifying, use and integration of the local knowledges, related skills and custom procedures created by people, in preserving health and welfare of predominantly working and productive animals[1]. The most populated countries (China, India, Russia, Brasil etc.) with vast regions, possess a great deal of traditional veterinary doctrine in contrast to the small ones. The Balkan Peninsula presents interesting area considering various microclimate varieties, as well as mixture of several nations and religions, and of course, their customs that influence the traditional (folk) ways in treatment of animals of animal treatment. Unfortunately, there were only a few researches in those regions regarding the traditional (folk) modes of animal treatment that were scientificaly based on. One of them divided plants into the groups for nutrition and treatment, or both[2]. Anoter study gave a scientific review of the plants useful for veterinary medicine along Serbia and North Macedonia[3].

One of them was carried out in the late 70s of last century, which had been run by several medicine, veterinary and pharmacy professors from Belegrade University in Serbia[4]. They were mostly focused on

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in humans and animals based on natural medicinal herbal substances and herbal preparations. The segment of this investigation was already published[5] concerning traditional dentistry knowledge, what motivated authors to state the aim of this report and collect national wealth related to the treatment of animals. This wealth is diverse and wisely designed, but there is threat of oblivion, because new times carry new, modern methods of treatment. The aim was to present the collected data about folk methods of treatment and nutrition by the help of available plants related to the animals in Serbs to determine what is doctrinary correct, but underestimated, which could be applied in modern veterinary medicine.

Material And Methods

Data collection

This study was conducted during summer period of 1981-1991 and 1993-1995 on the groups of domicile population. The data were obtained from the persons to whom traditional veterinary medicine was not official profession such as horseshoe craftsmans, horse subduers, several folk herbalists, folk dentists and several very old persons. Iterviewed persons were in the age range of 30-90 years. They originated mostly from remote settlements (small towns, distant villages, without veterinary clinics, who dealt with folk veterinary medicine long time in the past and at the moment of the study.

Subjects were asked to show and describe the plants (their usable parts or herbal substances) used on site and describe the period of collection. The researchers collected information on local names of plants, mode of preparation and administration way, and lately were identified through botanical taxonomy[6, 7]. Residents in the examined places were asked to show the plant species in a fresh or dried condition, if it was possible and what was recorded in prepared inquiry sheet (Fig. 1a, Fig. 1b). Plants were put into the herbarium and later classified, while some names were corrected if it was needed. Collected data about herbs were recorded after memory, i.e. through the family background, unfortunately without written papers. Actually, from their own practice and lessons from their "teachers". Data from certain regions gave doctors of veterinary medicine and pharmacists, who secondarily gathered them from local traditional healers and old experienced personsand herbalists. This method was assumed to be authentic enough for all investigated regions (map given in supplements).

The preliminary study pointed out that the most appropriate way of data collecting was immediate terrain method, whether by individual or team work. That method assumed direct data obtaining from all of the pooled subjects through a previously designed questionnaire of some thirty questions. The research was conducted with the help of the trained pollsters: university professors of pharmacy and students of Faculty of Pharmacy, Belgrade University (final academic years), where pharmacists participated in the plant identification. Data gatherers were warned about language during the poll, where inquiry answers should be respected in the sense of exact noting in the local dialect. Doing so, the original phytonymes about plants could be regularly and linguistically interpreted and explained. The data were obtained from 39 representative places from Serbia, Federation of Bosnia and Herzegovina and Republic of Srpska

(Republika Srpska) and North Macedonia (Fig. 2). Observed localities in Serbia were presented on the Figure 3, as well as headquarters (Belgrade, Kruševac, Ćuprija).

Geographical area of the study embraced continental and Mediterranean climate types/subtypes between 41°52'to 46°11' North latitudes and 18°26'to 23°00' East longitude, encompassing area of 102.350 km².

In order to collect data related to the health of livestock and domestic animals, a questionnaire with 28 questions was designed (Table 1). Surveys were mostly done personally and directly by semistructured interview. The data were primarily obtained from the oldest persons from the surveyed sites (villages, hamlets, etc.). Cattle breeders were also involved in the treatment of livestock[4].

The questionnaire contained the following questions presented in supplementary file both on original appearance and translated to English. Among the others, researchers wanted to see if the hellebore was used in the treatment of man or animals due to its alkaloid ingredients? What types of hellebore were used and which plants are poisonous to the animals?

Results

Classified and prepared material consists of total 1120 inquiry sheets. Traditional healers used predominantly herbal recipes, whereas majority was noted as beneficial ones, while very few methods of treatment appeared as inadequate (magical practice).

The results presented in the Table 1. show the alphabetical arrangement of the listed plants, namely: botanical taxa, voucher specimen codes, botanical family, local names, English name, the quotation frequency among informants, the used plant parts, as well as usage and preparation.

Table 1. The percentage of partition of physiological systems regarding animal diseases.

Digestive system*	Pulmonary system	Skin, hair, hoof	Urinary system	Other
47%	25%	8%	7%	13%

* Included mouth and teeth diseases (cleaning, trauma healing, etc.).

Sorted botanical names in alphabetical order, useful plants for making recipes in traditional veterinary medicine are given in Supplement 1.

Among 1120 inquiry sheets the 17 data averagely were obtained per one sheet. The percentage of partition about recipes for physiological systems regarding animal diseases was as follows: digestive system 47%, pulmonary system 25%, skin (hair, hoof) 8%, urinary system 7% and other 13% (Table 2). Digestive system contained tooth and oral diseases (cleaning, trauma healing, etc.). Out of all gathered prescriptions predominantly used by traditional healers were herbal recipes for treatment, while some of

them were of nonherbal origin. The most frequent used plants were noted in six prescriptions (*Carlina acaulis*, Asteraceae), five (*Geum urbanum*, Rosaceae) and three genera by four recipes (*Artemisia absinthium*, Asteraceae; *Helleborus odorus*, Ranunculaceae, *Micropus erectus*, Asteraceae) (Table 3). There was no evidence of hellebore used orally or through the blood, but only inserted into the previously cut skin at cattle.

Table 2. The most frequent used plants.

	Plant species	Number of prescriptions
1.	<i>Carlina acaulis</i> , Asteraceae	6
2.	<i>Geum urbanum</i> , Rosaceae	5
3.	<i>Artemisia absinthium</i> , Asteraceae	4
4.	<i>Helleborus odorus</i> , Ranunculaceae	4
5.	<i>Micropus erectus</i> , Asteraceae	4

Some of the *recipes for animal diseases* are listed below:

- * The sick sheep were given water or grass to eat, drink or spray.
- * Wordless sortilege with flour in your hand.
- * Magical giving a piece of Johnny-cake in the form of animal to cattle and dogs.
- * Juice from a fruit compote for the treatment of animals.
- * For better health of otherwise healthy animals (sheep, cows) milkiness, cereals mixed with grass were given: garden angelica (*Angelica archangelica*, Apiaceae), Milenko's root.
- * For the feasts, cattle and the dog were fed within a piece of cake / festival cake.
- * Before the Easter, sheep and cows were given in the evening, together with the bran, these mixed grasses, finely chopped, to use as much active ingredient: the garden angelica (*Angelica archangelica*, Apiaceae) and Milenko's root. This was given to the sheep and cows to increase milk yield.
- * Prior to the Easter, the next grasses would be harvested: bigroot geranium (*Geranium macrorrhizum*, Geraniaceae) and wormwood (*Artemisia absinthium*, Asteraceae) and given to sheep for health.
- * On St. John's day herbs were picked up and preserved for the probable later disease of the cattle – St. John's grass (*Micropus erectus*, Asteraceae), or the yellow bedstraw (*Galium verum*, Rubiaceae) - St. John's flowers.

- * Sheep are fed with a mixture of grass on the Easter eve: oats (*Avena sativa*, Poaceae), bran, wormwood (*Artemisia absinthium*, Asteraceae), white bryony (*Bryonia alba*, Cucurbitaceae) and grass sheep-bla. In the absence of salt, the sheep were re-fed with this mixture in a week.
- * For Easter sheep were given herbs in the food: meadow sage (*Salvia pratensis*, Lamiaceae) and old man's beard (*Clematis vitalba*, Ranunculaceae).
- * In case of the occurrence of a cattle's plague, they are expelled through live fire. The same was done for the appearance of foot-and-mouth disease. Then the cattle were stigmatized.
- * Juice from a fruit compote apple (*Malus domestica*, Rosaceae), pear (*Pyrus communis*, Rosaceae), plum (*Prunus domestica*, Rosaceae), quince (*Cydonia oblonga*, Rosaceae) for the digestive treatment of big animals – sheep, goats, livestock, pigs, horses, dogs.
- * For better milkiness and better quality of milk to the cattle were given: burnet-saxifrage (*Pimpinella saxifraga*, Apiaceae), garden burnet (*Sanguisorba minor*, Rosaceae), bedstraw (*Galium cruciatum*, Rubiaceae), white man's foot (*Plantago major*, Plantaginaceae) and St. John's grass (*Micropus erectus*, Asteraceae).
- * The pythonesses give tansy (*Tanacetum vulgare*, Asteraceae) with a food to the sheep which loses milk.
- * Silver thistle (*Carlina acaulis*, Asteraceae) was given to increase milk yield in cows.
- * For wounds in animals, there was a recipe: masterwort (*Peucedanum ostruthium*, Apiaceae) was cooked, and the liquid was mixed with frankincense (*Boswellia* sp., Burseraceae) and wax and served as a wound lubricant.
- * In the sheep, wound on udder was greased and it was given to drink marigold tea (*Calendula officinalis*, Asteraceae). Tea was generally given in any animal disease.
- * For the sheep fertility and milkiness were given rye (*Secale cereale*, Poaceae), as well as spurge (*Euphorbia cyparissias*, Euphorbiaceae).
- * When the sheep gives birth to lambs, it was immediately given oat (*Avena sativa*, Poaceae), preferably in the evening and in the morning.
- * Corn bran to improve milk yield.
- * For milkiness in all lactating animals were given wood avens (*Geum urbanum*, Rosaceae), silver thistle (*Carlina acaulis*, Asteraceae), yellow bedstraw (*Galium verum*, Rubiaceae), St. John's grass (*Micropus erectus*, Asteraceae) and other plants.
- * Grasses harvested on St. John's day were given to cattle and pigs in order to protect them from disease: yarrow (*Achillea millefolium*, Asteraceae), bryony (*Bryonia dioica*, Cucurbitaceae), silver thistle

(*Carlina acaulis*, Asteraceae), wood avens (*Geum urbanum*, Rosaceae) and dodder (*Cuscuta epithymum*, Convolvulaceae).

* Inhabitants of distant villages search for help from medicasters and folk wound-healers.

* Cooked wheat with bran was given for strengthening to the sick cattle. Robert herb (*Geranium macrorrhizum*, Geraniaceae) and wormwood (*Artemisia absinthium*, Asteraceae) were picked up the day before the Easter and given to the sheep for health.

* After St. George's day (in May), the sheep were fed with chaff mixed with lovage (*Levisticum officinale*, Apiaceae) and danewort (*Sambucus ebulus*, Adoxaceae). The sheep were fed with herbs: meadow sage (*Salvia pratensis*, Lamiaceae) and old man's beard (*Clematis vitalba*, Ranunculaceae) for the Easter.

* They were stirred with firebrand from a fire of teasel wood (*Dipsacus* sp., Caprifoliaceae) in bovine plague.

* Burnet-saxifrage (*Pimpinella saxifraga*, Apiaceae), white man's foot (*Plantago major*, Plantaginaceae), garden burnet (*Sanguisorba minor*, Rosaceae), bedstraw (*Galium cruciatum*, Rubiaceae) and St. John's grass (*Micropus erectus*, Asteraceae) for fertility and milkiness.

* Tansy (*Tanacetum vulgare*, Asteraceae) were given to the sheep to restore lost milk.

* The cows were given ryegrass (*Lolium perenne*, Poaceae), silver thistle (*Carlina acaulis*, Asteraceae) for milk synthesis. Before the first milking, female animals were given masterwort (*Peucedanum ostruthium*, Apiaceae), or the wood avens (*Geum urbanum*, Rosaceae) and the dodder (*Cuscuta epithymum*, Convolvulaceae).

* Wounds on the sheep and lamb's udder were treated by boiled masterwort (*Peucedanum ostruthium*, Apiaceae), frankincense (*Boswellia* sp., Burseraceae) and wax were spread on.

* Rye (*Secale cereale*, Poaceae) and spurge (*Euphorbia cyparissias*, Euphorbiaceae) were given for milkiness and fertility of the sheep. After milking, they were given to eat eggs, salt and greensward of grass.

* Milkiness was enhanced in female animals by silver thistle (*Carlina acaulis*, Asteraceae), wood avens (*Geum urbanum*, Rosaceae) and yellow bedstraw (*Galium verum*, Rubiaceae).

* In diseases of livestock in general were given: yarrow (*Achillea millefolium*, Asteraceae), wild pumpkin (*Cucurbita pepo*, Cucurbitaceae), silver thistle (*Carlina acaulis*, Asteraceae), wood avens (*Geum urbanum*, Rosaceae) and dodder (*Cuscuta epithymum*, Convolvulaceae).

* In diseases of sheep in general, the skin is cut and hellebore (*Helleborus odorus*, Ranunculaceae) is placed in the wound.

* The hellebore (*Helleborus odorus*, Ranunculaceae) induces the chicken to stop to carry eggs.

Veterinary related diseases

* In rabies, wounds from bites were lubricated with garlic (*Allium sativum*, Amaryllidaceae), which was left on the wound. Before that, disinfection was performed with alcohol drink made from plum (*Prunus domestica*, Rosaceae) called “shlyivovitza”.

* In some villages, after the bite, some tendons below the tongue of people were cut and these places were lubricated with salt and garlic (*Allium sativum*, Amaryllidaceae).

* Anthrax disease of a group of herbivorous animals such as horses, cattle, goats and sheep. Spores of anthrax can be found in all products of diseased cattle - meat, skin, fur, wool and horns. Anthrax mainly affects people who are in direct contact with the diseased or dead animals, as well as people who are engaged in industrial processing of livestock products. Infection can also occur by ingestion of insufficient thermally treated milk or meat of diseased animals.

* Pig fever and other diseases. Pigs were rubbed with common houseleek (*Sempervivum tectorum*, Crassulaceae) and with its water.

* The pig's papula under the neck was treated by putting the hellebore (*Helleborus odorus*, Ranunculaceae) into the ear.

* Foot and mouth disease: cooked root of the nettle (*Urtica dioica*, Urticaceae) was placed on paws and with that water paws were bended for a few days, several times a day. They also treated paws with cooked water from common oak (*Quercus robur*, Fagaceae) and lubricated paws with “shlyivovitza” and fat.

* Sheep illness: cross gentian was given (*Gentiana cruciata*, Gentianaceae).

* Poultry diseases were treated by crushed pepper (*Capsicum annum*, Solanaceae) and then given with bran to eat. Boiled water from the ash (*Fraxinus excelsior*, Oleaceae) was also given. Acidified water from yeast fungi too.

* Pain in the form of colic in horses and diseases of the stomach and intestines in other animals: to a poisoned cattle is given a cup of plum-brandy or water from cooked wormwood (*Artemisia absinthium*, Asteraceae).

* Tumidity in cattle: milk and sugar. Tumidity in the sheep: hellebore (*Helleborus odorus*, Ranunculaceae) in the ear or/and on the chest.

* Cold in cattle: crushed pepper is put in mouth and nose (*Capsicum annum*, Solanaceae).

* Steeply papulae in the mouth are cut, then salt and peppers (*Capsicum annum*, Solanaceae) are put in.

* Although one recipe usually for one disease was noted, there were a few for multi purpose usage: predominantly for snake bite, it is to crush the sambucus leaves to apply directly at the place of the snake bite or a bee sting; also for burns, skin inflammations, oedema, eczema and urticaria.

Discussion

Medicinal herbs are the oldest remedy for all nations, on all over the continents and in all epochs, which was the main reason to run this review of research. Even though, some diseases are eradicated nowadays, we decided to present our results of folk tradition in treatment of animals among Serbs, so to keep that knowledge from the oblivion. The same areas (spots) and collecting methods as in our previous published article for human oral diseases[5] were processed with some corrections that were arisen from the previous studies in the Republic of Serbia. The great need for the research of this kind is seen in many publications[8-10].

Considering those literature data we also noted that during the many-years terranian research it was often difficult to distinguish what kind of collected data was pharmacological- veterinary ally justified, and what was from religious or magical aspect, since some types of plants, as well as their application, were performed on certain days of the Julian Calendar (very seldom of catholic or muslim one). Pharmacologically, each plant, or its part (flower, fruit, tree, leaf, root) is taken for preparation in a certain part of the day and month, in order to achieve a great effect what was very strictly protocolised among village people.

Modern veterinarian pharmacology and pharmacognosy should harvest the fruits from recorded recipes, using plants from still unpolluted Balkan regions. The reason to be optimistic is report from India, where 16 brand new herbal species were recognised for the treatment in dental medicine. Even up to 2004 year those herbs had not been recognised and classified by Indian ethnobotanical and phytotaxonomical literature[11]. The interesting example of cow product was the case when mostly villagers use “within reach” medicaments, which was amazingly similar between local Serbian and Dinka population (African mostly Christian Ethiopian tribe). Maybe due to religion speeding (Orthodox Christianity in Ethiopia was established as early as in the 4th century). Both populations have prescription of ash mixture of cow dung and sticks of *Salvador persica* (the toothbrush tree) for digital teeth cleaning in cattle[12]. Each plan noted in this research was compared with a fresh specimen and a picture from literature, what suggests in very objective and accurate data[6, 7].

Regarding the active substances of collected plants, Serbian authors categorized them into the several groups as adstringents, anaesthetics, antisecretolytics, antibiotics, antimalarics, antineuralgics, corrigenses, styptics, antiseptics, repelents, sedatives, sialogogues, tonics, vulneraries etc.[4]. It may be concluded that most of folk healers (therapeutists) trust more in phytotherapy, rather than in modern veterinary medicine and its drugs. Similar study was conducted in South Africa who interviewed members of 25 households and made a list of 53 herbs used as veterinary medicines[13]. Medicines were most prepared by means of a decoction or infusion in water and administered by bottle or a nip. Other

administration included adding the plant material to drinking water, wash and directly to the skin. Only 25 of 53 plants listed in the same study was previously recorded in veterinary uses in the literature[13].

Long before the development in the West, the veterinary medicine tradition in India had already a large body of theoretical and practical knowledge[14]. Studies showed that traditional usage of remedies in India was often justified[15, 16]. In Zimbabwe, use of ethnoveterinary medicine to treat livestock was studied through oral interviews and discussions with 69 small holder farmers and 3 traditional healers[17]. Results showed that local citizens use 23 plant species belonging to 16 families as ethnoveterinary remedies. Two plant families were frequent in usage: Fabaceae and Solanaceae, while the most utilized plant species were *Aloe chabaudii*, *Aloe greatheadii*, *Adenium multiflorum*, *Vernonia amygdalina*, *Nicotiana tabacum*, *Solanum lycopersicum*, *Capsicum annum* and *Pouzolzia hypoleuca*. Fourteen animal conditions were identified in the surveyed area. The major and most common animal disease were tick-borne diseases, eye problems, retained afterbirth, fleas, lice and diarrhoea[17].

It may be noticed that in many poor rural areas, ethno veterinary medicine plays an important role in animal production and livelihood development, and often becomes the only available means for farmers to treat ill animals[13, 18-23]. This kind of herbal medicine provides a valuable alternative and complementarity to the western veterinary drugs. Therefore, there is need to document this local knowledge of ethnoveterinary healing and conserve it through systematic studies before it is lost forever [24].

Considering before mentioned, there is a great need in the Republic of Serbia to record the inherited knowledge in traditional veterinary medicine, passing experience from generation to generation promptly and authentically because accelerating urban changes threaten to all of that heritage will fall into oblivion in the near future. Especially, to collect data from not yet investigated areas (Eastern Serbia, Kosovo and Metohia). It will be of great benefit to post online data around the world about traditional methods of herbal use in veterinary medicine.

Still many people in distant nonurban areas use various herbal recipes, especially as the first aid in veterinary medicine.

Conclusion

This article gives a review of plants often and seldom used in ethnoveterinary medicine, although the set of numbers is much larger in prevention and treatment of animal diseases. The most of plants are used for digestive (47%), pulmonary (25%), skin (hair, hoof) (8%) and urinary system (7%). The most frequent used plants in prescriptions were *Carlinaacaulis*, Asteraceae (6 times) and *Geumurbanum*, Rosaceae (5 times). It is still open question for the scientific branches of pharmacology to find out active ingredients, mechanism of action and application of some plants in the scope of phytochemistry and phytopharmacology.

Declarations

Ethics approval and consent to participate The beginning of this study was started 50 years ago when no ethics approval and consent to participants was required.

- Consent for publication. Consent will be sent.
- Availability of data and materials The plant materials used and/or analysed during the current study are available from the corresponding author on reasonable request, while raw data are included as supplementary files
- Competing interests The authors declare that they have no competing interests
- Funding This study was supported by Ministry of Education, Science and Technological Development of the Republic of Serbia project II 43009 (Contract number 451-03-9/2021-14/200143)
- Authors' contributions

ID-Main idea and design

RH, and AN – plants collection keep and determination,

RSN, SRR and ZN – samples collecting, interview and data processing

PI – text draft, review of final manuscript and critical assessment of the data

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- Authors' information (optional) This paper is a result of a group work between veterinary doctors, botanists and dental doctors. This paper presents insight in traditional knowledge and the authors tried to present naïve people perspective and point of view, even some are inclining to religious interpretations.

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Figures

No

HERBAR LEKOVITOG BILJA

latinsko ime _____ familija _____

lokalna narodna imena _____ nadm. visina _____

opis nalazišta _____

UPOTREBA

Koji deo biljke:
 Vreme sakupljanja:
 Način sušenja:
 Način čuvanja:
 Kako spravljati lek:

Koje bolesti leči i kako: _____

Za ljude ili domaće životinje:
 Ostala upotreba: _____

mesto i datum _____ potpis _____

1a

No

HERBARIUM COLLECTION OF MEDICINAL PLANTS

latin name _____ family _____

local folk names _____ altitude _____

description of the site _____

U S A G E

Which part of the plant:
 Time of collecting:
 Way of drying:
 Way of keeping:
 How to prepare a medicine:

What diseases heals and how:

Is it for people or domestic animals:
 Other usages:

place and date _____ signature _____

1b

Figure 1

(a) Questionnaire (information sheet) in the original language of ethnobotanical interview - Serbian. (b) Questionnaire (information sheet) in English. The information sheet is accompanied by two herbarium specimens.

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Figure 2

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The data were obtained from 39 representative places from Serbia, Federation of Bosnia and Herzegovina and Republic of Srpska (Republika Srpska) and North Macedonia (Fig. 2).

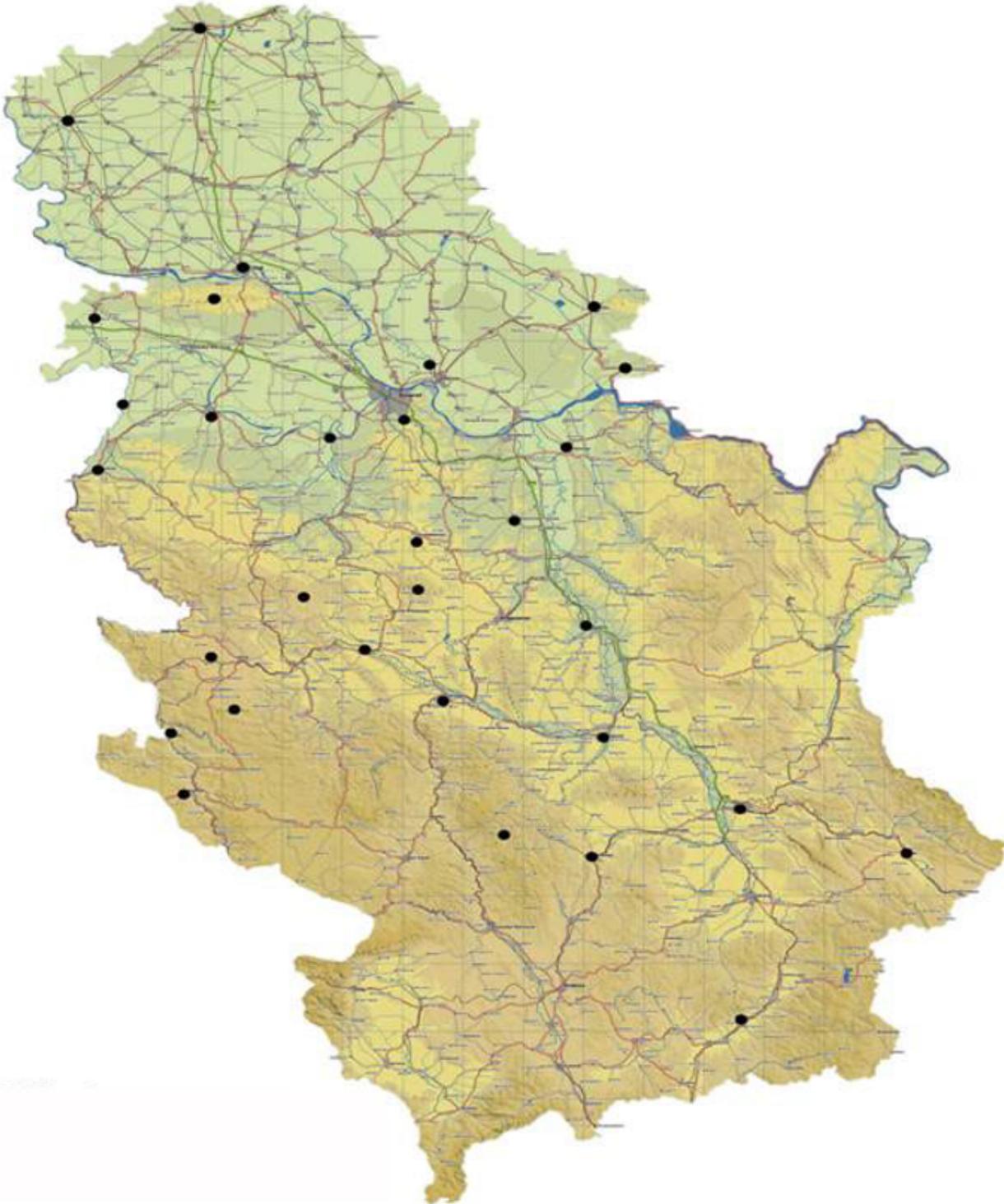


Figure 3

Map of studied places in Serbia (•) and headquarters (Belgrade, Krusevac, Cuprija) (*).

This is a list of supplementary files associated with this preprint. Click to download.

- [SuppTable1Questionnaire.docx](#)
- [Supplement1Listofplants.docx](#)
- [GraphicalAbstract.png](#)