

New records of the remedial properties of vascular plants, some traditionally accepted as medicinal plants and some less familiar to ethnobotanists

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Abstract. Despite the existence of many relevant publications, and of reliable records of the traditional empiric data about medicinal plants in Bulgaria, over the last few years we have found quite a lot of hitherto undocumented data about the healing properties of plants. We therefore interviewed 156 people: some whom we knew to be particularly interested medicinal plants and traditional ways of healing, and also a random sample of people of different ages. These subjects were all over 18. The survey was called “Granny had a cure for this.” (or “Granny knew how to cure this.”) In this paper we present data for the remedial properties of plants which are usually recognized as medicinal herbs, but whose properties have been hitherto unknown, or which have not been documented in the literature. The data are listed according to the therapeutic effect of the plants. Comparative analysis has been made of relevant studies.

Key words: ethnobotany, medicinal plants, remedial properties, therapeutic effect

Introduction

As a whole, the traditional knowledge of medicinal plants and their uses, preserved and transmitted from generation to generation, is quite well documented in Bulgaria. The collecting of common names was pioneered by teachers, university professors, naturalists, folklorists and physicians during 19th and 20th century. These pioneers recorded their use for conventional remedial purposes and also their use in traditional spells and magical rituals. (Stanev 2010). This collection of ethnobotanical data led to the publication of valuable scientific works (Petkov 1982; Mitrev & Popova 1982; Kitanov 1987; Pamukov 1992; Nikolov 2006). The traditional knowledge documentation bases the list of 741 taxa recognized in Bulgaria by the law as medicinal plants, although the therapeutic effect

and application is not specified (Medicinal Plants Act 2000). The formulas of the famous Bulgarian healer, Peter Dimkov, are well known for their efficacy, as is accepted by the vast majority of Bulgarians. His books have gone into numerous editions (Dimkov 2001). During the last few decades, ethnobotanical research has been performed both by national and foreign scientists (Ivancheva & Stantcheva 2000, Leporatti & Ivancheva 2003, Ploetz & Orr 2004, Nedelcheva 2009, Nedelcheva & Dogan 2009, Kültür & Sami 2009, De Boer 2010).

The development of new drugs has often taken place as the result of clues provided by local and traditional knowledge of the medicinal or toxic effects of vascular plants, algae, fungi etc. This traditional expertise is not always acknowledged, but many scientists have seen this to be one of the driving forces

of ethnobotanical research (Giovannini & Heinrich 2009; Heinrich 2010). Medicinal plant based products are frequently studied by scientists and market researchers after they are released on the market, frequently with contradictory results (Getov & al. 2007; Stoynova & Getov 2010).

In the contemporary reality of globalization and urbanization in Bulgaria, traditional empiric ethnobotanical knowledge is disappearing. Often and often we find that when we question rural people they say, "There used to be a woman who knew all about medicinal plants but she passed away". These traditional experts can belong to both sexes, but the great majority were women – a few were famously expert, but many had a good general knowledge of the subject. This is not surprising because the mother was, and is, the parent who would deal with most common ailments and illnesses. Traditionally this knowledge was transferred to a female child and in absence of a girl the knowledge was lost. Despite that discouraging tendency observed in ethnobotanical research during the last decade, we have found several examples of traditional empiric data which had not been documented and so we were inspired to see what more had been overlooked.

The aim of our study was to test the contemporary status of the traditional knowledge about medicinal plants – how much Bulgarians trust medicinal plants and how it is related to their age and gender, to what extent the tradition is alive, what are most popular medicinal plants and for what disorders they were used. This approach is related not only to the cultural traditions but it is a potential base for further socio-pharmacology research attempting to find out how well medicines and food supplements are accepted by the patients (Kozuharova & Benbassat in prep. Kozuharova & Getov in prep.).

In this particular paper we focus on the data for remedial properties which we found to be apparently new or as yet not documented in the literature for generally acknowledged medicinal plants. We aimed to document this empiric information on the traditional use of plants 1) and thus to preserve the knowledge that has still not been recorded in the literature and 2) also to provide opportunities for further study of chemical constituents and/or biological activities. Comparative analysis has been made of relevant studies dealing with same health disorders or same plants.

Material and methods

The most common method used in ethnobotanical studies is to interview potentially useful subjects. The researcher may focus on a certain therapeutic category or ask questions with a wider, less defined scope. The author's assessment of the implications of the study, and of the further uses of a particular medicinal plant may, of course, differ from that of other researchers. (Nolan & Robbins 1999; Ertug 2000; Vandebroek & al. 2004, Everest & Ozturk 2005; Pieroni & al. 2005; Heinrich & al. 2009; Pieroni & al. 2011; Mustafa & al. 2012).

In order to test the contemporary status of the traditional knowledge about medicinal plants we performed the study as a Rapid Ethnobotanical Appraisal in the way of structured interview based on fixed questions namely what plants are used against certain health disorders (Gerique 2006).

Our research team consisted of lecturers in pharmaceutical botany and pharmacognosy and undergraduate students. We devised a questionnaire listing the main groups of medicinal problems: problems with vision, inflammation of the eyes, inflammation of the ears, skin inflammations, rashes, warts, joint pains, rheumatism, sciatica, exostoses, failures of the immune system, colds, bronchitis or other problems of the, respiratory tract, contraception, miscarriage, breast feeding, mastitis, colic, bedwetting, blood disease, hypertonia, heart disease, gastrointestinal tract-diarrhea, constipation, kidneys, problems of the urinary tract, cystitis, menstrual disorders, prostatitis, treatment of trauma/wounds, memory loss and insomnia. (In this category it is important to specify what the questions were.)

The key point concerned the origins of the information – the source of knowledge had to be that it had been transferred from generation to generation in the traditional way, not learned from books. In other words, our motto was "Granny's cure for this was..."

During the summer of 2011, 183 interviews were carried out. There were two target groups: a few people whom we knew to be particularly interested in medicinal plants and traditional ways of healing and a much larger group, the majority, which was a random sample of people – male and female of different social status and different ages, above 18. As we aimed to get a Rapid Ethnobotanical Appraisal on the contemporary status of the traditional knowledge about

medicinal plants in Bulgaria the interviews were performed in towns and villages from different districts of Bulgaria (Fig. 1). As a result of urbanization, strict topographic localization of the knowledge is impossible. The data obtained from the inhabitants of town might originate from villages nearby, or from villages quite far away. The plants were identified after Jordanov (1963–1979), Velchev (1982–1989) and Kozhuharov (1995).. Ideally, we to obtained a sample of the plant in question, or 'voucher material', but most often we were given a description which would go with the common name. If the voucher was in bad condition it was rehydrated in warm dilute alcohol, prepared correctly so that diagnostic features remained visible, and dehydrated carefully. Then it was either identified by comparison to reference material in the herbarium (registered herbaria of University of Sofia and Institute of Botany, SO, SOM – *Thalictrum minus* – a rather polymorphic species, Fig. 2) or we consulted to the leading taxonomist in the taxonomically problematic group Dr M. Anchev (*Brassica* sp.). In this second case, fruits were required for correct identification so we could not go further than the genus level. The data are grouped according to the therapeutic effect in the Results and Discussion part of this paper. We include a comparative analysis of the published literature concerning data for the content of secondary compounds and also an analysis of the popular use of these compounds as well as a summary of other plants recommended for such disorders in folk medicine.

Results and Discussion

Totally 77 plant species (including the ones in the formula combinations) were mentioned during the investigation. They belong to 38 families. The data for remedial properties which we found apparently new or as yet not documented in the literature for generally acknowledged medicinal plants are grouped in accordance to the therapeutic effect.

Inflammation processes

Wound healing

Thalictrum minus L. (*Ranunculaceae*) – Meadow-rue Lesser [common names in Bulgarian – obichniche. There is another name which was new to us: demirbuzan]. The record is from Verinsko village (Ichtiman, in the district of the Sredna Gora Mts). Plant material (a small piece of a leaf) with this common name, was handed to us, together with the information that it was used for wound healing (Fig. 2). Literature searches revealed that this is a fairly uncommon name of archaic Turkish origin, not used in Turkey nowadays. We found only one reference in the literature, which in fact referred to *Thalictrum aquilegifolium* (Ahtarov & al. 1939). The wound healing effect of *Thalictrum minus* is reported to be quite rapid, with emphasis is on the reduction of scars. It is especially effective against sepsis. The infusion (about 1 part plant sub-



Fig. 1. Districts of Bulgaria where interviews were performed.



Fig. 2. *Thalicttrum minus* L. – voucher form the informer and reference herbarium material from Herbarium of Vascular Plants (SOM).

stance, the leafy parts to 1 part water boiled till the water gets nearly black) is applied externally after cooling down to body temperature (pleasant for the skin). Warning – the infusion should not be too concentrated because in that case it causes pain. Also very small dose is may be taken against gastric ulcer. Many existing records refer to the traditional belief that this herb should be worn as an amulet. The leaves are placed in amulets for good luck, health, love (the common name translates literally as “lovewort”) and to protect the wearer from evil spells. It is listed as a medicinal plant in the law dealing with medicinal plants (Medicinal Plants Act 2000). The plant contains berberine-type alkaloids and has cytostatic effect (Kumazawa & al. 1984; Velcheva & al. 1999; Vanisre & al. 2004).

***Salvia verticillata* L. (Lamiaceae)** – Lilac Sage [common names in Bulgarian – preshlenesta kakula, kon-ski bosilek, and a new name found in this study zhetvarska bilka]. Voucher material was presented for identification (Fig. 3). The fresh leaves are used to cover wounds in cases of cuts (the common name, zhetvarska bilka, is connected to that as it translates literally as “harvesterwort”). This species is listed as a medicinal plant according to the law dealing with medicinal plants (Medicinal Plants Act 2000). However, in the published literature there are no details about its use. Kitanov (1987) reports just its use together with *S. pratensis*, and *S. nemorosa*. The use other species of the same genus namely *S. sclarea* is documented for external application in cases of skin disorders (Nikolov 2006). The records that we found published for *Salvia verticillata* (perennial native to a wide area ranging from central Europe to western Asia) are from Turkish folk medicine but the application is against nausea – decoction of leaves (Tuzlaci & Doğan 2010). The other traditional application from Anatolia, Turkey is against cough and colds (Tabata & al. 1994). Turkish folk medicine uses other species of the same genus for wound healing, namely *S. aethiopsis* (Sezik & al. 2001). Different species of sage (*Salvia* sp. div.) and Saint John’s Wort *Hypericum perforatum* are used in a wound healing formula which was new to us, based on traditional Turkish folk medicine (Süntar & al. 2011).

Ear disorders (inflammation)

***Ruta graveolens* L. (Rutaceae)** – Common Rue [common name in Bulgarian – sedefche] This popular sed-

ative herb is also known as a uteral tonic and a treatment for insect bites (Petkov 1982), Our research produced a new application. For inflammation of the ear, an alcohol extract of the leaves is applied. This is a traditional application in the Middle East (Atta & Alkofahi 1998), demonstrating yet again the cultural links between adjoining countries and the transfer of traditional knowledge.

***Sempervivum* sp. div. (Crassulaceae)** – Houseleek, Hen and Chicks [common name in Bulgarian – debela Mara, debeletz]. The juice from fresh leaves is applied in the ear to treat inflammation. Some of the people interviewed recommended putting a whole leaf in the ear not just drops of juice. Other informants recommended using one *Sedum* leaf. (There is slight confusion between the common names in Bulgarian for *Sedum* and *Sempervivum* sometimes called one and sometimes the other as both are succulent), but further discussion revealed that in this case the plant in question is *Sedum* sp.



Fig. 3. *Salvia verticillata* L. – voucher form the informer.

It is interesting that of all “Granny’s cures”, this particular use as an anti-inflammatory and pain killer was the most commonly mentioned, although it was not well documented in Bulgarian ethnobotanical literature. It is also interesting cross-cultural ethnobotanical tradition as the same application of *Sempervivum* is reported for Albanian Alps in Kosovo (Mustafa & al. 2012).

Mastitis

***Potentilla reptans* L. (Rosaceae)** – Creeping Cinquefoil [common names in Bulgarian – palziasht ochibolotz, petoprustche] This plant is fairly effective against mastitis. Decoction is applied per os. Water and aerial parts of the plant in ratio 1:1 are boiled until the liquid has been reduced by half. After several hours of application, combined with total body warming under a hot shower, the sepsis will be found to have drained away. Subsequent lactation will be abundant. This information comes from the district of Vidin. This plant is recognized by the law as medicinal (Medicinal Plants Act 2000). However, it is not among the most popular herbs. In the most complete Encyclopedia of medicinal plants it is just mentioned without details of its use (Nikolov 2006). In Bulgarian folk medicine it is known as a cure for diarrhea, dysentery, and bleeding gums (Petkov 1982).

***Brassica oleracea* cultivar (Brassicaceae)** [common name in Bulgarian – zele]. The leaves are applied externally on the breasts in the Vidin district (Danube River). Similar application of leaves, but baked not raw, is reported against mastitis and additionally pain in shoulder for the Dolomiti Lucane, inland southern Italy (Pieroni & al. 2004). In the Albanian Alps mastitis of cows is treated externally with the chopped and salted leaves of *Sanguisorba minor* L. (Pieroni & al. 2005). There are a great many plants that are used for the treatment and control of mastitis in stock in district Sargodha, Pakistan e. g. *Capsicum annuum*, *Lepidium sativum*, *Allium sativum*, *Citrus limon*, *Cuminum cyminum*, *Zingiber officinale*, *Curcuma longa*, *Peganum harmala*, *Citrullus colocynthis*, *Centrathrum anthelmisticum* etc. (Dilshad & al. 2010)

Cystitis

Rosa sp. div. (Rosaceae) – Rose hips [common name in Bulgarian – shipka] Rose hips can be used as a douche in cases of cystitis, but this is a less common application for one of the most popular medicinal plant substances.

Coughs of bronchial origin

Rosa sp. div. (Rosaceae) – Rose gall known as Robin’s Pincushion. In coughs of bronchial origin, the Robin’s Pincushion, has an anti-asthmatic and anti-tussive activity. These Rose galls are excrescences caused by the female imago of *Diplolepis rosae* L. into which eggs are injected. It is recommended to boil 20 of these excrescences in water and drink the decoction regularly.

Inflammation of the Tonsils

***Helleborus odorus* Waldst. & Kit. (Ranunculaceae)** – Fragrant hellebore [common name in Bulgarian – kuku-riak]. With regard to the external application of *Helleborus odorus*, we came across interesting information on how to make a compress for inflamed tonsils. A strip of soft dough is made. Pounded dry root (rhizome) of hellebore is sprinkled on top and then the whole thing is wrapped around the neck. The neck is then bandaged with cotton cloth. With small children, the compress would be kept on for 20 minutes to an hour, once or twice a day. To treat foot and mouth disease in sheep, external use (washing) is recommended. Hellebore is also believed to be a cure for hair loss and the treatment of scurf (Petkov 1982). The plant is poisonous, as it contains cardiac glycosides (Nikolov 2006).

Aphthous stomatitis

***Persica vulgaris* Mill (Rosaceae)** – Peach [common name in Bulgarian – praskova]. Seven or eight dry or fresh leaves of peach are steamed with 200 ml boiling water. It is very effective against Aphthous stomatitis. We have not found any new references for such an application so far.

Cystitis

Rosa sp. div. (Rosaceae) – **Rose hips** [common name in Bulgarian – shipka] Rose hips can be used as a douche in cases of cystitis, but this is a less common application for one of the most popular medicinal plant substances.

Coughs of bronchial origin

Rosa sp. div. (Rosaceae) – **the rose gall known as Robin’s Pincushion.** In coughs of bronchial origin, the rose gall known as Robin’s Pincushion, has an anti-asthmatic and anti-tussive activity. These Rose galls are excrescences caused by the female imago of *Diplolepis rosae* (Linnaeus, 1758) into which eggs are injected. It is recommended to boil 20 of these excrescences in water and drink the decoction regularly.

Anti-haemorrhoid

***Prunella vulgaris* L. (Lamiaceae)** – Common Self-heal [common name in Bulgarian – prishitza]. We were told that this plant was useful in treating haemorrhoids. Although the species is recognised as medicinal (Medicinal Plants Act 2000) it is only rarely mentioned in the literature of Bulgarian medicinal plants. Knowledge, or belief, in such an anti-haemorrhoidal therapeutic effect has been passed from generation to generation, and preserved to recent times among the Ozarks (Scottish Irish and German immigrants in SE parts of US), as is reported by Nolan & Robbins (1999). Extract of *P. vulgaris* demonstrated cytotoxic activity (Kuo-Hsiung Lee & al. 2000). In addition, extract of *P. vulgaris* proved to have a scavenging activity on diphenylpicrylhydrazyl radical (DPPH), inhibition of *in vitro* human LDL Cu(II)-mediated oxidation, protection of rat mitochondria and rat hepatocytes exposed to either *tert*-butyl hydroperoxide, or to Cu(II) and Fe(III) ions (Psotová & al. 2003). Polysaccharide fraction *Prunella vulgaris* was tested and found to be effective against Herpes simplex viruses' infections – both the HSV-1 and HSV-2 (Chi-Ming Chiu & al. 2004). Sterol glucosides and triterpenoids are found in *Prunella vulgaris* (Kojima & al. 1990; Kojima & Ogura 1992).

Other applications

Cytostatic

***Brassica* sp. (Brassicaceae)** – Cabbage [common name in Bulgarian – zele]. This group is difficult taxonomically and in the absence of fruits on the voucher material, identification cannot go further than level of genus (Fig. 4). Cytostatic effect was reported by a gypsy woman in the region of Tzarevo. Although this seems quite an unusual application for this plant, there are number of research reports that indicate cytostatic activity. Glucosinolates and/or their breakdown products have long been known for their fungicidal, bacteriocidal, nematocidal and allelopathic properties and have recently attracted intense research interest because of their cancer chemoprotective attributes. Numerous reviews have addressed the occurrence of glucosinolates in vegetables, primarily the family *Brassicaceae* (syn. *Cruciferae*; including *Brassica* spp. and *Raphanus* spp.), and particularly selective cytostatic and cytotoxic effects on human colon cancer cells *in vitro* (Fahey & al. 2001). Glucosinolates and their myrosinase-catalysed derived compounds such as isothi-



Fig. 4. *Brassica* sp. – voucher form the informer.

ocyanates present in *Brassica* vegetables and salad crops have been studied, and methods are being developed to exploit them in medicinal chemistry application with regard to the potential uses of these natural compounds as anticancer and antimicrobial agents (Fimognari & al. 2004). Cytostatic activity is found in other mustard relatives like *Raphanus sativus* var. *hortensis* (Mezencev & al. 2009). Consumption of cruciferous vegetables has been associated with a reduced risk in the development of various types of cancer. This has been attributed to the bioactive hydrolysis products that are derived from these vegetables, and *Eruca sativa* in particular, namely isothiocyanates. Erucin is one such product derived from rocket salads, which is structurally related to sulforaphane, a well-studied broccoli-derived isothiocyanate. Erucin can be considered a naturally occurring ITC able to affect selectively cancer cell growth, as shown in human leukemia cells (Melchini & Traka 2010).

***Plantago major* L. (Plantaginaceae)** – Greater Plantain [common name in Bulgarian – shirokolisten zhivovljak]. One informant stated that “the consumption of fresh leaves of Female Plantain chopped into a paste melted down internal tumour”. After some discussion with the informant, the plant source was identified as *Plantago major*. This plant species is popular as a wound heal-

er and as a remedy for snakebite, uses which have been found to have scientific merit. One of its common names is “Soldier’s Herb” for its use on the battlefield as a field dressing. However, there is also some scientific evidence for anticancer activity. Methanolic extracts from seven *Plantago* species used in traditional medicine for the treatment of cancer, were evaluated for cytotoxic activity against three human cancer cell lines recommended by the National Cancer Institute (NCI, USA). The results showed that *Plantago* species exhibited cytotoxic activity, showing a certain degree of selectivity against the tested cells in culture (Gálvez & al. 2003)

Nocturnal enuresis

***Potentilla reptans* L. (Rosaceae)** – besides cure for mastitis was also reported as a treatment for bed wetting. Nocturnal enuresis is not new to the twentieth century. Historical reviews document the presence of bed-wetting and its social dilemmas as far back as 1500 B. C. Current studies have shown that approximately 15 percent of 5-year-old children remain wet at night. Therapy is not easy and so far the alarm system remains the most effective treatment. (Monda & Husmann 1995). The physical mechanism of night wetting in children is not clear and is hard to separate from the psychological aspects of the problem (Butler 1998).

Hypotensive effect

***Allium schoenoprasum* L. (Alliaceae)** – Common Chives [common name in Bulgarian – sibirski luk]. Rapid hypotensive effect is reported after consumption of fresh leaves of wild population Common Chives. There are no records in the Bulgarian literature on folk medicine that this plant has a therapeutic effect, although it is recognized by the law as medicinal (Medicinal Plants Act 2000). *A. schoenoprasum* grows on wet mountain habitats and has a comparatively restricted distribution, which may be the reason for the infrequent references in ethnobotanical records. It is known as an edible plant, but there have been warnings that it may cause poisoning in mammals, especially dogs (Cope 2005, Salgado & al. 2011). The primary toxicological mechanism of *Allium* species-derived organosulfur compounds is oxidative hemolysis, which occurs when the concentration of oxidants in the erythrocyte exceeds the capacity of the antioxidant metabolic pathways. Allicin and ajoene, pharmacologically active agents in garlic, are potent cardiac and smooth muscle relaxants, vasodilators, and hypotensive agents (Cope

2005). Thus the information we obtained deserves attention because hypertensive effect of garlic is has been pharmacologically proven on humans (Petkov 1982). It is possible that the biologically active compounds of *A. schoenoprasum* might be more powerful. It may be worth further research work on this species, bearing in mind the allergenic side-effects of some hypertensive pharmaceutical products.

Schizophrenia

***Plantago subulata* L. (Plantaginaceae)** – Awn-leaved Plantain [common name in Bulgarian – grebenest zhivovljak]. The plant species is used against schizophrenia. This species is recognised by the law as medicinal, together with other six species of the genus including *Plantago major* and *Plantago lanceolata* (Medicinal Plants Act 2000). However this is not popular medicinal plant in Bulgaria and we did not find published literature about its use in the Bulgarian folk or official medicine. Thus it is a dubious record so far.

Exostoses

***Nerium oleander* L. (Apocynaceae)** – Oleander, Kanker [common name in Bulgarian – zokum]. This plant also contains cardiac glycosides and is toxic (Nikolov 2006). It is already recorded as a cure for rheumatism (Nikolov 2006). We found data about a new external application of Oleander. An alcohol extract, which is made from the leaves and left to stand in darkness for a week, is used to cure exostoses.

Conclusions

Most of the new data that we found were connected to healing of inflammatory processes in one or another form. Some of the unrecorded knowledge that we found deserves further research.

We consider that wound healing effect of *Thalictrum minus* subsp. *majus* deserves further pharmacological research. The rapid disappearance of pus, wound healing, and reduction of scars are of significant importance for the pharmaceutical practice. We would suggest/propose that research into methods of cultivation of this plant should go forward simultaneously with more laboratory research as, although the plant is not rare, the resources for potential industrial application may not be sufficient when they become needed. The proven cytostatic effect is an adequate precondition for this course of action.

The other prospective plant of potential practical importance is *Potentilla reptans*. Some women suffer acutely from mastitis and Gynecologists have to resort to surgical intervention. The possibility of solving the problem with a much milder method based on the healing properties of this plant is attractive. Nocturnal enuresis in the pediatric age group can create tremendous anxiety for patients and parents and all potential possibility for therapy is worth testing. The positive effect in cases of nocturnal enuresis deserves attention and requires further in-depth pharmacological research. Thus *Potentilla reptans* would be a good candidate for further research into its biological effect on the central nervous system. What is known so far from the phytochemistry of this plant species does not explain such effects. Biologically active compounds found in *Potentilla reptans* so far are tannins (Antal 2010). However their presence cannot explain the previously mentioned therapeutic effects. The good news is that *Potentilla reptans* is widely distributed and has a wonderful ability for vegetative propagation so it would be easy to cultivate and obtain a standardized plant substance.

It would also be worth testing the power of the hypotensive effect of *A. schoenoprasum* bearing in mind the side allergenic effects of some hypotensive pharmaceutical products.

The implication for our further research on this species is that we need to collect the necessary quantity of plant substance of *Brassica sp.* from the same locality where the ethnobotanical data was collected and perform standard tests for its cytostatic effect together with precise identification of the species.

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