

## Ten plant species most commonly used in the form of tea and plant food supplements in Bulgaria

Vladislav Bachev<sup>1\*</sup>, Iliyana Yaneva<sup>2</sup>, S. Georgiev<sup>3</sup>, Ignat Ignatov<sup>4</sup>

1. Master-pharmacist, “Siyana” Pharmacy, 33 Todor Kableshkov Str., Sofia, Bulgaria

2. Associate Professor, National Center of Public Health and Analyses, 15 Akad. I. Geshov Blvd, Sofia  
1431, Bulgaria

3. Associate Professor, Medical University, Faculty of Pharmacy, 15–A V. Aprilov Blvd, Plovdiv

4. DSc, Professor, Scientific Research Center of Medical Biophysics (SRCMB), 32 N. Kopernik Str., Sofia  
1111, Bulgaria

\*E-mail of the corresponding author: [vbachev@yahoo.com](mailto:vbachev@yahoo.com)

### Abstract

The use of plants to maintain health is one of the most ancient methods in the world and in our country. A large number of plant species are used based on their traditional use. Literature data show that people use plant products to maintain their health in the form of teas, juices, plant medicinal products, plant food supplements, etc.

The purpose of this publication is to study the plant species most commonly used in 2016 in the form of plant products (PP) - (PFS<sup>1</sup>, teas<sup>2</sup>)<sup>3</sup> which are intended to be purchased without medical prescription and observation by participants in a cross-sectional survey study (2017), which is the first of its kind in Bulgaria. The cross-sectional survey study has been conducted with 400 individuals (N=400) aged 18-80 years who have expressed willingness and consent to complete a worked out questionnaire with anonymity guaranteed.

The methods used are: a sociological method - direct individual paper survey cards, a documentary method. The statistical analysis of the data from survey cards has been performed using SPSS 20.0 statistical package.

The results of the study performed show that the ten plant species most commonly used by the respondents in a descending order in the form of tea are: valerian (*Valeriana officinalis* L.), camomile (*Matricaria chamomilla* L.), linden (*Tilia*), ginkgo biloba (*Ginkgo biloba* L), black elder (*Sambucus nigra* L.),

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<sup>1</sup> Plant Food Supplements – foods that aim to complement the normal diet, which contain plants, parts and extracts of plants. PFS are offered in the form of capsules, tablets, pills and others such as powder sachets, ampoules of liquids, drops and other similar forms, intended for taking in small unit quantities, intended for use without doctor’s prescription and observation ([Garcia-Alvares, A. et al, 2014](#))

<sup>2</sup> Tea – water extract obtained by boiling or steaming of dried parts of plants or whole plants

<sup>3</sup> Within the meaning of this study

peppermint (*Mentha piperita* L.), thyme (*Thymus serpyllum* L.), rosehip (*Rosa canina* L.), senna (*Cassia angustifolia* Vahl.), and in the form of plant food supplements are: valerian (*Valeriana officinalis* L.), camomile (*Matricaria chamomilla* L.), ginkgo biloba (*Ginkgo biloba* L.), linden (*Tilia*), St. John's Wort (*Hypericum perforatum* L.), black elder (*Sambucus nigra* L.), thyme (*Thymus serpyllum* L.), bearberry (*Arctostaphylos uva-ursi* L.), rosehip (*Rosa canina* L.), lavender (*Lavandula angustifolia* Mill.). Valerian (*Valeriana officinalis* L.) is the plant species most commonly used by the respondents both in the form of tea and PFS.

**Keywords:** ten most commonly used plants, tea, plant food supplement, Bulgarian consumers

## 1. Introduction

According to literature data plants are used for health and dietetic purposes in the form of teas, juices, plant medicinal products, PFS, etc. (Menniti-Ippolito F et al., 2002; Larrañaga-Guetaria A., 2012; Garcia-Alvarez Al et al. 2014; Ritchie MR, 2007; Adams J et al., 2010). The majority of plant species in our country are used based on their traditional use (Materials for Bulgarian Botanical Guide, 1939). These different product categories are governed by specific legislation in the different countries depending on the product intended use. Individual countries vary in the process of regulatory control (Bachev, V. & I. Yaneva, 2018).

The purpose of this publication is to study the plant species most commonly used in 2016 in the form of plant products (PP) - (PFS, tea) which are intended to be purchased without medical prescription and observation by participants in a cross-sectional survey study (2017), which is the first of its kind in Bulgaria.

The respondents (N=400) in the study are aged 18-80 years and all come from Sofia. The results of the cross-sectional survey study show that PP are used by the respondents mainly „to improve their health“ – a relative share of 77,5%. The largest relative share belongs to the respondents preferring PP in the form of tea - 76,55%, followed by the group of those preferring PP in „another form not specified“ – it is most probably about juices and/or spices; then comes the group of respondents preferring PFS – 5,5% and the group of respondents preferring TPMP<sup>4</sup> with a relative share of 1,25% ranks last. The prevailing relative share of the group preferring tea can be explained by the traditional use of plants in this form in our country (Bachev et al., 2018). The average age of the respondents is 45 ± 13 years and the most common age among the participants is 39 and 42 years. Female respondents (54,8%) are prevailing among the respondents. The respondents are educated: 40% have secondary education, 30,25% have college education and 24,5% have higher education. These characteristics of the respondents are similar to the characteristics of PFS consumers (older, well-educated) participating in PlantLibra Project Consumer Survey (the first retrospective study of its kind in Europe with PFS consumers aged 18+ (the total sample is 2,359 PFS consumers) conducted in Finland, Germany, Italy, Romania, Spain and the United Kingdom (Garcia-Alvarez, Alicia et al., 2014). Higher PFS consumption is observed in women compared to men (Menniti-Ippolito F et al., 2002; Schaffer DM et al., 2003), which has been found in the study conducted in our country as well (Bachev et al., 2018).

PlantLibra Project Consumer Survey (Garcia-Alvarez, A. et al., 2014) has identified 491 different plant

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<sup>4</sup> Traditional plant medicinal products

products (PFS). Ginkgo biloba (Ginkgo biloba L.) is one of the most used plant species in the composition of PP.

## 2. Material and Methods

### 2.1. Research design

A (cross-sectional survey design) study was conducted with 400 people (N=400), aged 18-80 years in 2017 regarding the attitude of people toward using plant products (plant food supplements, traditional plant medicinal products, teas) in Bulgaria, which were intended to be taken without being subject to medical prescription and observation. All respondents expressed willingness and agreed to participate with guaranteed anonymity.

**Observation attributes** – The ten plant species most commonly used by the surveyed people (who have purchased PP in “Siyana” Pharmacy, city of Sofia, within 10 days), in the form of PFS and teas in 2016 are the subject matter of this publication.

**Time reference** – 3-7 July 2017 and 11-15 December 2017

### 2.2. Methods

#### A. Sociological method

**A.1. Direct individual paper-based survey** – completed anonymously by all responding people who have bought a plant product intended to be purchased without medical prescription and observation in “Siyana” Pharmacy, city of Sofia.

**A.2. Documentary method** – data analysis from: literature sources – monographs, scientific publications, Internet, etc.

**B. The statistical analysis of the data from survey cards has been performed using SPSS 20.0 statistical package.**

**Limitation** – the study has been conducted only in the city of Sofia where based on data from NSI<sup>5</sup> there is concentrated population of 1,325,429 people out of total of 7,050,034 people for the whole country, so the conclusions that will be drawn will only relate to the state population concentrated in the cities. Approximately 1/7 of the total population of the Republic of Bulgaria is concentrated in the city of Sofia. “Better employment opportunities” can be referred to as the main reason for that.

## 3. Results and Discussion

This study has identified 31 plant species used in the form of tea and 31 plant species used in the form of PFS used by the respondents in 2016. In both forms of PP use (as tea and PFS) the respondents have stated the same plants arranged in a different order for the two forms of use as follows – valerian (Valeriana officinalis L.), ginkgo biloba (Ginkgo biloba L.), camomile (Matricaria chamomilla L.), linden (Tilia), black elder (Sambucus nigra L.), thyme (Thymus serpyllum L.), St. John's Wort (Hypericum perforatum L.), rosehip (Rosa canina L.). Valerian (Valeriana officinalis L.) ranks first in both forms of PP use – as PFS and tea (table 1).

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<sup>5</sup> <http://www.nsi.bg/bg/content/2975/>

**Table 1**

Ten plants in the composition of PP (tea, PFS) most commonly used by the respondents in 2016 arranged in a descending order

No	Plant used in the form of tea	Plant used in the form of PFS
1	Valerian ( <i>Valeriana officinalis</i> L.)	Valerian ( <i>Valeriana officinalis</i> L.)
2	Camomile ( <i>Matricaria chamomilla</i> L.)	Camomile ( <i>Matricaria chamomilla</i> L.)
3	Linden ( <i>Tilia</i> )	Ginkgo biloba ( <i>Ginkgo biloba</i> L.)
4	Ginkgo biloba ( <i>Ginkgo biloba</i> L.)	Linden ( <i>Tilia</i> )
5	Black elder ( <i>Sambucus nigra</i> L.)	St. John's Wort ( <i>Hypericum perforatum</i> L.)
6	Peppermint ( <i>Mentha piperita</i> L.)	Black elder ( <i>Sambucus nigra</i> L.)
7	Thyme ( <i>Thymus serpyllum</i> L.)	Thyme ( <i>Thymus serpyllum</i> L.)
8	Rosehip ( <i>Rosa canina</i> L.)	Bearberry ( <i>Arctostaphylos uva-ursi</i> L.)
9	Senna ( <i>Cassia angustifolia</i> Vahl.)	Rosehip ( <i>Rosa canina</i> L.)
10	St. John's Wort ( <i>Hypericum perforatum</i> L.)	Lavender ( <i>Lavandula angustifolia</i> Mill.)

It can be noted that valerian (*Valeriana officinalis* L.) ranks first both when used in the form of tea (reported by 147 respondents - a relative share of 36,7%) and in the form of PFS (reported by 84 respondents - relative share of 21%).

PlantLibra Project Consumer Survey (Usage of Plant Food Supplements across Six European Countries: Findings from the PlantLIBRA Consumer Survey, Garcia-Alvarez, A. et al., 2014), conducted in Finland, Germany, Italy, Romania, Spain and the United Kingdom (Garcia-Alvarez, Alicia et al., 2014) has identified 491 different plant products (PFS) most commonly containing ginkgo biloba (*Ginkgo biloba*), evening primrose (*Oenothera biennis*) and artichoke (*Cynara scolymus*). Eleven most commonly used plants in the composition of PFS in these countries (number of consumers ranging from 194 to 100) have been identified based on the results of this study. The eleven plant species are arranged in a descending order as follows – Ginkgo biloba (ginkgo), *Oenothera biennis* (evening primrose), *Cynara scolymus* (artichoke), *Panax ginseng* (ginseng), Aloe vera (aloe), *Foeniculum vulgare* (fennel), *Valeriana officinalis* (valerian), *Glycine max* (soybean), *Melissa officinalis* (lemon balm), *Echinacea purpurea* (echinacea), *Vaccinium myrtillus* (blueberry). Differences as regards the arrangement of individual plant species are observed in individual countries. For example, PFS containing soybean (*Glycine max*) are most commonly used in Finland and ginkgo biloba (*Ginkgo biloba*), artichoke (*Cynara scolymus*) and olive (*Olea europea*) in Germany. In Romania ginkgo biloba (*Ginkgo biloba*) is the most commonly used plant species in the composition of PFS; in Italy it is aloe vera (*Aloe vera*). In Spain the most commonly used PFS contain artichoke (*Cynara scolymus*) followed by PFS containing valerian (*Valeriana officinalis*) and field horsetail (*Equisetum arvense*). In the United Kingdom evening primrose (*Oenothera biennis*) is the most commonly used plant species in the form of PFS (Garcia-Alvarez, A. et al., 2014). According to commercial data the plants ginkgo biloba (*Ginkgo biloba* L), echinacea (*Echinacea purpurea* Moench), garlic (*Allium sativum* L) and ginseng (*Panax ginseng* C.A.Meyer) are the four most commonly sold plants in seventeen European

Community member states. According to these data echinacea (*Echinacea purpurea* Moench) and ginkgo biloba (*Ginkgo biloba* L.) are part of the composition of medicinal products (European Advisory Services (EAS), 2007; Vargas-Murga, L. al., 2011). The conclusion that can be drawn is that ginkgo biloba (*Ginkgo biloba* L.) takes a leading position as a plant species included in the composition of various plant products - PFS, tea, plant medicinal products.

The results of this study compared to those of PlantLibra Project Survey (Usage of Plant Food Supplements across Six European Countries: Findings from the PlantLIBRA Consumer Survey, Garcia-Alvarez, A. et al., 2014), show differences from country to country as regards plant species used by consumers in the form of PFS. However, general trends have also been observed. For example, ginkgo biloba (*Ginkgo biloba* L.) and valerian (*Valeriana officinalis* L.) are in the top ten most commonly used plants in the form of PFS according to this study and according to PlantLibra Project Consumer Survey (Usage of Plant Food Supplements across Six European Countries: Findings from the PlantLIBRA Consumer Survey, Garcia-Alvarez, A. et al., 2014).

The fact that ginkgo biloba (*Ginkgo biloba* L.) is in the top ten of plants most used in the form of PFS, tea, which are intended to be purchased without medical prescription and observation is worrying. Every person can purchase these products without prescription. There are data in literature about side effects caused by ginkgo biloba (*Ginkgo biloba* L.) PP taken together with other medicinal products. According to some authors (Di Lorenzo, C., 2015), ginkgo biloba (*Ginkgo biloba* L.) ranks fourth in the likelihood of occurrence of adverse drug reactions resulting from concomitant use with other medicinal products. Occurrence of adverse drug reactions from the concomitant use of products of the plants ginkgo biloba (*Ginkgo biloba* L.), valerian (*Valeriana officinalis* L.), ginseng (*Panax ginseng* CAMeyer) with various medicinal products has been reported by other authors as well (Milić, N. et al., 2014). According to some authors symptoms of acute poisoning - vomiting, abdominal pain, diarrhea, fever, difficulty breathing, enlarged pupils, etc. may occur when using ginkgo biloba (*Ginkgo biloba* L.) seeds having the level of poisoning usually depending on the age and the amount of seeds taken (Jang et al. 2015).

#### 4. Conclusion

The results of this study in our country show that valerian (*Valeriana officinalis* L.) is the most used plant species in the form of tea and PFS. The ten plant species most commonly used by the respondents in 2016 in a descending order in the form of **tea** are: valerian (*Valeriana officinalis* L.), chamomile (*Matricaria chamomilla* L.), linden (*Tilia*), ginkgo biloba (*Ginkgo biloba* L.), black elder (*Sambucus nigra* L.), peppermint (*Mentha piperita* L.), thyme (*Thymus serpyllum* L.), rosehip (*Rosa canina* L.), senna (*Cassia angustifolia* Vahl.), and in the form of **plant food supplements** are: valerian (*Valeriana officinalis* L.), chamomile (*Matricaria chamomilla* L.), ginkgo biloba (*Ginkgo biloba* L.), linden (*Tilia*), St. John's Wort (*Hypericum perforatum* L.), black elder (*Sambucus nigra* L.), thyme (*Thymus serpyllum* L.), bearberry (*Arctostaphylos uva-ursi* L.), rosehip (*Rosa canina* L.), lavender (*Lavandula angustifolia* Mill.). Eight plants - valerian (*Valeriana officinalis* L.), ginkgo biloba (*Ginkgo biloba* L.), chamomile (*Matricaria chamomilla* L.), linden (*Tilia*), black elder (*Sambucus nigra* L.), thyme (*Thymus serpyllum* L.), St. John's Wort (*Hypericum perforatum* L.), rosehip (*Rosa canina* L.), are common for PP forms - PFS and tea - but

have been stated for the two forms in a different order. Ginkgo biloba (Ginkgo biloba L.) and valerian (Valeriana officinalis L.) are in the top ten most commonly used plants in the form of PFS according to this study and according to PlantLibra Project Consumer Survey.

It is desirable to have even PP, which are intended to be purchased without medical prescription and observation, taken after consulting a physician due to causing adverse drug reactions.

It is necessary to set up a comprehensive PP database containing reliable information about individual plant species as regards phytochemical composition, pharmacological activity, adverse drug reactions, adverse interactions in concomitant use with other medicinal and non-medicinal products, toxicity, contraindications and etc. to ensure the safety of patients using various PP.

## References

- Adams, J., Lui, C.W.&Sibbritt, D. (2009) Women's Use of Complementary and Alternative Medicine During Pregnancy: A Critical Review of the Literature, *Birth*, **36**: 237–245.
- Bachev, V. & Yaneva, I. (2018) Plant – Based Food Supplements: Bulgarian and European Legislation *Bulgarian Journal of Public Health*, **10**(1):53-66.
- Bishop, F.L. & Lewith, G.T. (2010) Who uses CAM? A Narrative Review of Demographic Characteristics and Health Factors Associated with CAM Use, *Evidence-Based Complementary Altern Med*, **7**: 11–28.
- Di Lorenzo, C., Ceschi, A., Kupferschmidt, H., Lude, S., De Souza Nascimento, E., Dos Santos, A. et al. (2015) Adverse Effects of Plant Food Supplements and Botanical Preparations: A Systematic Review with Critical Evaluation of Causality, *Br J Clin Pharmacol., England*, **79**(4):578–92.
- European Advisory Services (EAS) (2007) The Use of Substances with Nutritional or Physiological Effect Other Than Vitamins and Minerals in Food Supplements. Study undertaken for DG SANCO, *European Commission*. Service contract nrSANCO/2006/E4/018. Available:  
[http://ec.europa.eu/food/food/labellingnutrition/supplements/documents/2007\\_A540169\\_study\\_other\\_substances.pdf](http://ec.europa.eu/food/food/labellingnutrition/supplements/documents/2007_A540169_study_other_substances.pdf)
- Garcia-Alvarez, A., Egan, B., De Klein, S., Dima L., Maggi F., Isoniemi, M., Ribas-Barba, L., Raats, M., Meissner, E., Badea, M., Bruno, F., Salmenhaara, M., Mil à Villarroel, R., Knaze, V., Hodgkins, C., Marculescu, A., Uusitalo, L., Restani, P. & Serra-Majem, L. (2014) *Usage of Plant Food Supplements across Six European Countries: Findings from the PlantLIBRA Consumer Survey*, *PLoS One*, **9**(3): e92265. Published online 2014 Mar 18. doi: 10.1371/journal.pone.0092265, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3958487/>
- Jang, H., Roh, S. Y., Jeong, E. H., Kim, B.-S., & Sunwoo, M. K. (2015) Ginkgotoxin Induced Seizure Caused by Vitamin B6 Deficiency, *Journal of Epilepsy Research*, **5**(2), 104–106. <http://doi.org/10.14581/jer.15018>
- Ignatov, I. (2018) Research of the Factors of Health and Longevity for the Population in Bulgaria, *Bulgarian Journal of Public Health*, **10** (1): 52-85.
- Larrañaga-Guetaria, A. (2012) PlantLIBRA: PLANT Food Supplements, Levels of Intake, Benefit and Risk Assessment. The Regulatory Framework for Plant Food Supplements in the EU, *AgroFOOD Industry Hi-Tech*, **23**(5): 20–22.

Materials for Bulgarian Botanical Guide (1939) Collected by B. Davidov and A. Yavashev, Arranged by M. Shosev and P. Balabanov, Supp. and Edited by B. Ahtarov, Sofia, Court Printing House, 575 pages

Menniti-Ippolito, F., Gargiulo, L., Bologna E., Forcella, E.&Raschetti, R. (2002) Use of Unconventional Medicine in Italy: A Nation-Wide Survey, *Eur J Clin Pharmacol*, **58**: 61–64.

Milić, N., Milosević, N., Golocorbin Kon, S., Bozić, T., Abenavoli, L.&Borrelli, F. (2014) Warfarin Interactions With Medicinal Herbs, *Nat Prod Commun*, **9**(8):1211-6.

National Center for Health Statistics (2009) National Health and Nutrition Examination Survey (NHANES) - 30-Day Dietary Supplement Use. Available:

[http://www.cdc.gov/nchs/nhanes/nhanes2005-2006/DSQDOC\\_D.htm](http://www.cdc.gov/nchs/nhanes/nhanes2005-2006/DSQDOC_D.htm).

Ritchie, M.R. (2007) Use of Herbal Supplements and Nutritional Supplements in the UK: What do We Know About Their Pattern of Usage?. *Proc Nutr Soc* **66**: 479–482.

Schaffer, D.M., Gordon, N.P., Jensen, C.D., Avins, A.L. (2003) Nonvitamin, Nonmineral Supplement Use Over a 12-Month Period by Adult Members of a Large Health Maintenance Organization, *J Am Diet Assoc*, **103**(11): 1500–1505.

Vargas-Murga, L., Garcia-Alvarez, A., Roman-Viñas, B., Ngo, J., Ribas-Barba, L., Van Den Berg, S.J., Williamson, G.&Serra-Majem. L. (2011) Plant Food Supplement (PFS) Market Structure in EC Member States, Methods and Techniques for the Assessment of Individual PFS Intake, *Food Funct*, **2**(12): 731–739.