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CURRENT APPROACHES TO THE MULTI-VECTOR SEARCH OF PERSPECTIVE PLANT OBJECTS FOR NEW MEDICINES

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The work is devoted to possible approaches concerning the search of promising plant objects for creating new medicines and their use by the example of herbal collections for dental practice. 110 prescriptions of folk and traditional medicine used for the treatment of inflammatory diseases of parodontium and the mucous membrane of the oral cavity have been chosen and analyzed. The belonging of herbal components of the collections studied to the families of Asteraceae (16.39%), Rosaceae (11.48%), Lamiceae (9.02%), and Apiaceae (6.56%) has been determined. The number of herbal compositions in prescriptions has been calculated and according to the results the dominance of the group with 4-6 ingredients has been revealed. Analyzing the plants in prescriptions according to the type of the raw material it has been found that in compositions of herbal collections the overground parts, such as herbs (30.15%) and leaves (17.65%), are dominant types of the raw material. In collections studied according to the rating of usage the most frequently used plants are garden sage, wild chamomile, oak, calendula, St. John's wort, sedge, stinging nettle, thyme, common yarrow, common origanum, wild rose. For the indicated list of medicinal plants stable combinations with other species of plants represented schematically have been grouped. The ways of conducting the research together with the data obtained concerning the search of promising plants that can be used for scientific evidence of the compositions of multicomponent medicines based on the medicinal plant raw material intended for drug therapy of a number of pathological conditions, particularly inflammatory stomatological diseases, have been outlined.

Centuries-long experience in application of phytotherapy and phytomedicines in different fields of medicine demonstrates the expediency of creation of new medicines based on the medicinal plant raw material (MPRM) [6, 7]. Herbal drugs also take a leading position in the complex treatment of inflammatory dental diseases. Plant-based medicines are represented by different dosage forms both as mono- and multicomponent medicines for local application and more rarely for internal use. A separate MPRM and herbal collections used to prepare aqueous and water-alcoholic extracts were included into dental practice a long time ago and into the treatment regimens of diseases of the oral cavity [1, 2].

Development of the composition of complex herbal medicines implies multi-vector approaches because it is necessary to take into consideration a number of factors: pathogenesis of diseases, the content of biologically active substan-

ces in medicinal plants, combination of components, etc. [4, 5, 8].

The aim of the research is to determine possible approaches to the search of a promising MPRM and its further application while creating herbal collections, particularly for dental practice. To achieve this goal it is necessary to consider the information sources concerning phytotherapy in dentistry, to choose collections of MPRM, to analyze the combinations of herbs selected by the number of ingredients, to distribute them according to the type of the raw material, to determine the most widespread medicinal plants and their combinations with other plants in the composition of the collections studied.

Materials and Methods

As the objects of the research the collections of medicinal plants, as well as the initial plant raw material of their composition, which folk and traditional medicine offer for the treatment of inflam-

matory diseases of parodontium (IDP) and the mucous membrane of the oral cavity (MMOC) were chosen. The data of information sources (encyclopedias, reference books, internet resources) were the subject of the analysis [1-3, 9-11]. During the research we were guided by the methods of modern information retrieval, the systemic and comparative analysis and the generalization method.

Results and Discussion

Having considered the information sources selected we have separated 110 herbal collections that are used for drug therapy of IDP and MMOC. It has been determined that 122 medicinal plants belonging to 48 different families are found in these prescriptions. It has been found that the most widespread families of the components of the phytocompositions studied are *Asteraceae* consisting of 20 species of plants (16.39%), *Rosaceae* with 14 representatives (11.48%), *Lamiceae* – 11 (9.02%), *Apiaceae* – 8 (6.56%). Three families such as *Ericaceae*, *Fabaceae*, *Polygonaceae* were represented

Table 1

Distribution of herbal collections used in dental practice by to the number of components

The number of components	The number of collections	The share from the total number of collections,%
2	19	17.27
3	22	20.00
4	29	26.36
5	15	13.64
6	15	13.64
7	5	4.54
8	2	1.82
9	1	0.91
10	2	1.82
Total	110	100.00

by equally a smaller number of plants (6 types in each, representing 4.92%).

The collections of herbs selected differed significantly by the number of ingredients. The collections studied were distributed by the number of components given in Table 1.

According to Table 1 it has been noted that more than a quarter of the total number of the collections analyzed consisted of four components. The prescriptions that contained 2, 3, 5 and 6 plants accounted for a smaller proportion (13.64-20.00%). The smallest proportion (up to 5%) included collections containing more than 6 ingredients.

The herbal compositions selected were divided according to the type of the raw material represented in Table 2.

Besides pharmacopoeial species of MPRM (flowers, herbs, leaves, branches, fruits, seeds, roots, rhizomes, rhizomes and roots, cones, etc.), it has been noted the presence of other species of the plant raw material (petals, fruit peel, branches with leaves, etc.) in this dosage form. Due to the fact that the sources of folk medicine were also analyzed and in some plants several types of the raw material were used, the total number of plants and the raw material varied (for example, leaves, flowers, roots were typical for stinging nettle in

Table 2

The plant raw material in the composition of collections for the treatment of diseases of the oral cavity

The type of the plant raw material	Use	Share,%
Buds	3	2.21
Flowers	17	12.50
Bark	4	2.94
Rhizome	4	2.94
Roots	17	12.50
Leaves	24	17.65
Fruits	12	8.82
Herb	41	30.15
Other (cones, inflorescences, roots with rhizomes, gallnuts, husk, fruit peel, pine needles, seeds, thallus, petals, branches with leaves)	14	10.29
Total	136	100.00

prescriptions). The group "Others" included both pharmacopoeial types of MPRM and nonpharmacopoeial plants occurring singly; on the whole it was 10.29%.

As shown in Table 2, in the prescriptions herbs were used most frequently (30.15%), leaves were used almost twice less (17.65%). Underground parts were used much less frequently than overground parts: roots – 12.50%, rhizomes – 2.94%, roots and rhizomes – 1.47%.

The next stage of the research was to determine the most commonly used MPRM-components of the collections and their combinations with other herbs in the prescription. There were 122 MPRM-components analyzed with determination of the frequency of occurrence, and only 11 medicinal plants were selected for the consideration. They can be seen in Fig. 1 together with the percentage of frequency of usage. The objects that are mentioned rarely or do not have the repeatability in combinations are not shown in Fig. 1.

The most frequently used plants were conditionally divided into 3 groups. The first group (in more than 15% of collections) comprised oak, calendula, wild chamomile, garden sage; the second group (the proportion was in the range of 10-15%) included St. John's wort, sedge, thyme, stinging nettle; the third group (less than 10%) was composed of origanum, yarrow, wild rose.

Since it has been found that collections more commonly consist of 4-6 ingredients, we have selected 11 medicinal plants that are the most frequently used. It is rational for them to determine stable combinations with other plants and take into consideration the theoretical substantiation of the components of the collection while developing its composition.

The combination of medicinal plants of conditional groups 1-3 with other species indicated in the prescriptions studied is represented in Fig. 2-4.

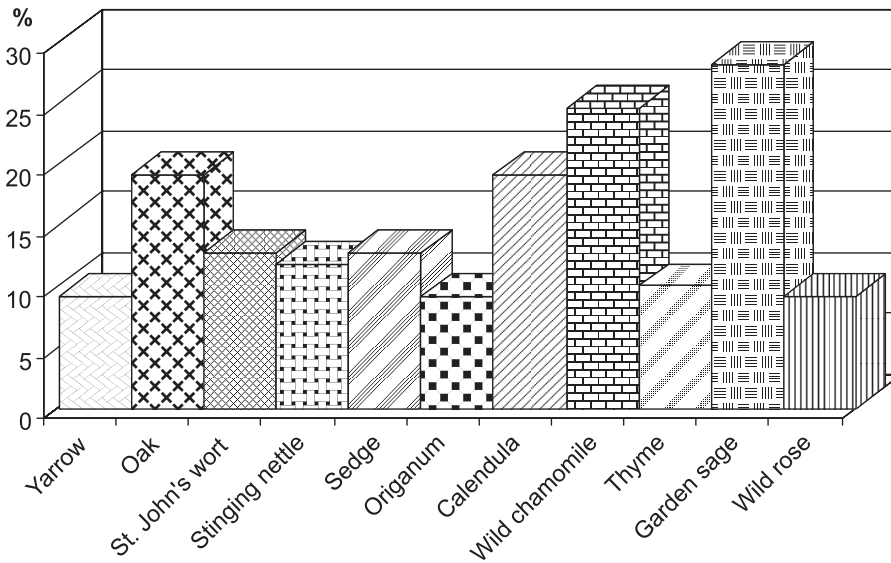


Fig. 1. The rating of the most frequently used MPRM in the collections for the treatment of IDP and MMOC

According to the results shown in Fig. 2, it was found that garden sage was most frequently combined in collections with calendula (9.09%), oak (7.27%), and with St. John's wort, wild chamomile (5.45% each). Prescriptions of garden sage with the raw material of sedge (4.55%), yarrow, stinging nettle, thyme (3.64% each) were less commonly used.

Combinations of wild chamomile with calendula were identified in 10.00% of the collections,

it was combined with garden sage and oak almost twice more seldom (5.45% each). It has been determined that the raw material of wild chamomile can also be combined with southern sumac, woundwort, licorice, plantain, bur-marigold, bitterling.

Similar combinations were also observed for oak. The raw material of the plant was most frequently mentioned with garden sage, more rarely with thyme and wild chamomile (4.55% each), St. John's

wort and sumac (3.64% each), with the raw material of walnut, yarrow, licorice, linden, origanum (2.73% each).

For calendula, besides the above mentioned combination with wild chamomile and garden sage, there were combinations with yarrow, St. John's wort, bur-marigold and others.

Analyzing the schemes of Fig. 3 it was noted that medicinal plants of the second group were often used in compositions with the objects

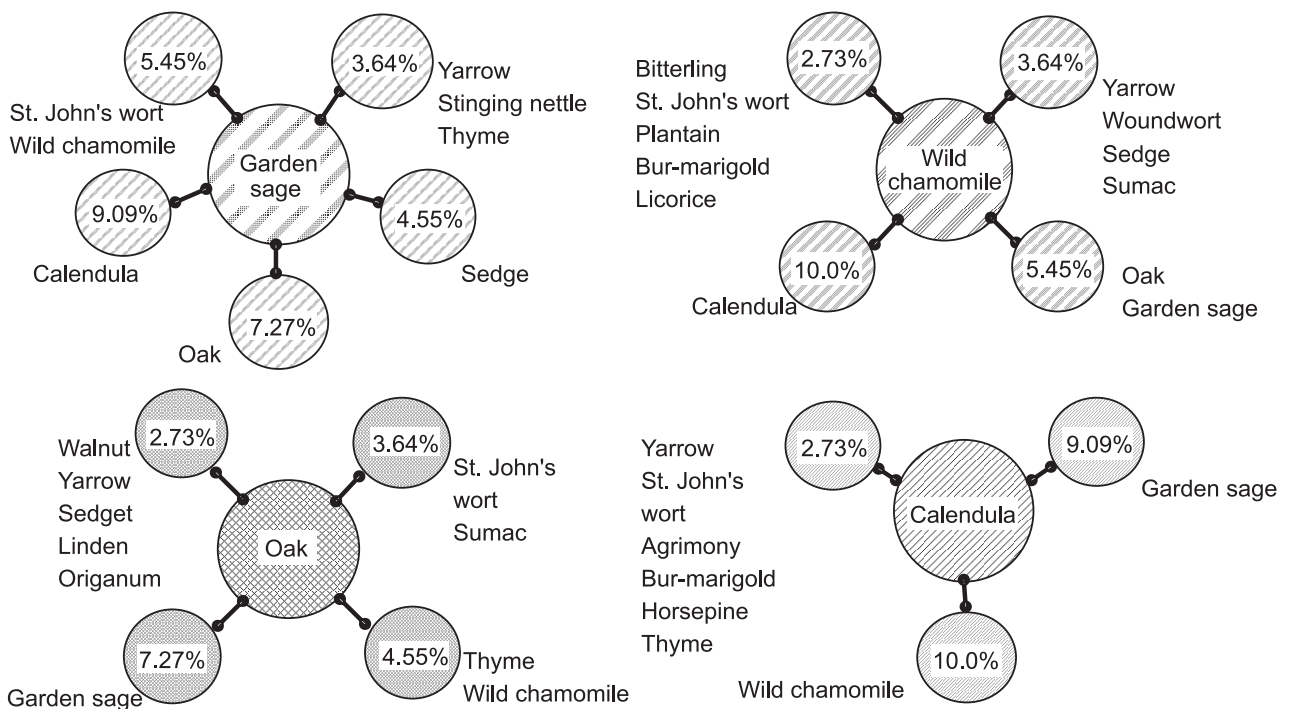


Fig. 2. The combinations of medicinal plants from group 1 in collections

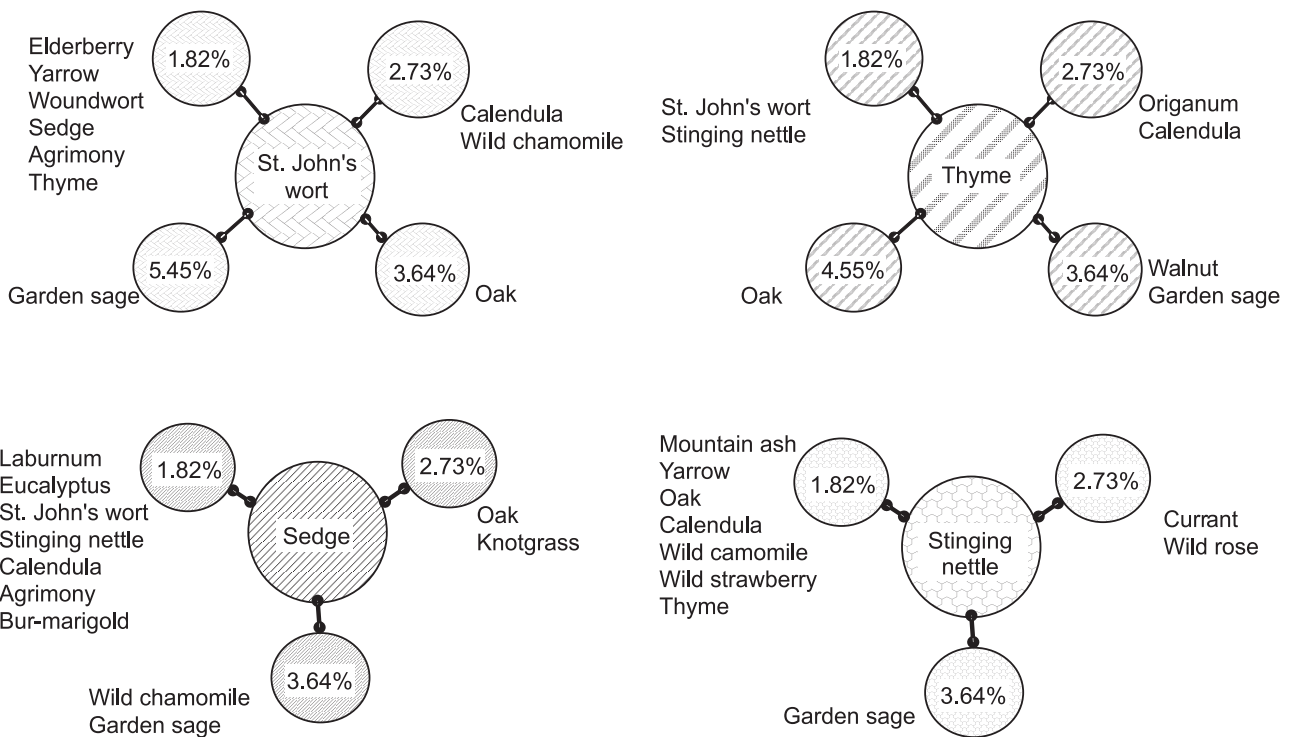


Fig. 3. The combinations of medicinal plants from group 2 in collections

of the first group. For instance, St. John's wort was more frequently combined with garden sage (5.45%) and oak (3.64%), more rarely with calendula, wild chamomile (2.73% each). The least frequent (1.82%) was the combination of the herb with elderberry, yarrow, sedge and others.

Wide-spread combinations for thyme were those with oak (4.55%), garden sage and walnut (3.64%

each), more rarely with origanum, calendula (2.73%) and St. John's wort, stinging nettle (1.82% each).

For sedge the most frequently used combinations were those with garden sage and wild chamomile (3.64%), with dog-bean, St. John's wort, calendula, stinging nettle and others (1.82% each).

Stinging nettle in 3.64% of prescriptions was combined with garden sage and only in 1.82% of pre-

scriptions there were combinations with oak, yarrow, wild chamomile, calendula, etc.

According to Fig. 4, it was determined that common origanum was most frequently combined with althaea, balm (3.64% each). The most wide-spread (3.64%) for yarrow was its use with oak, wild chamomile and garden sage. Wild rose in 2.73% was combined with rowan, stinging nettle, black currant.

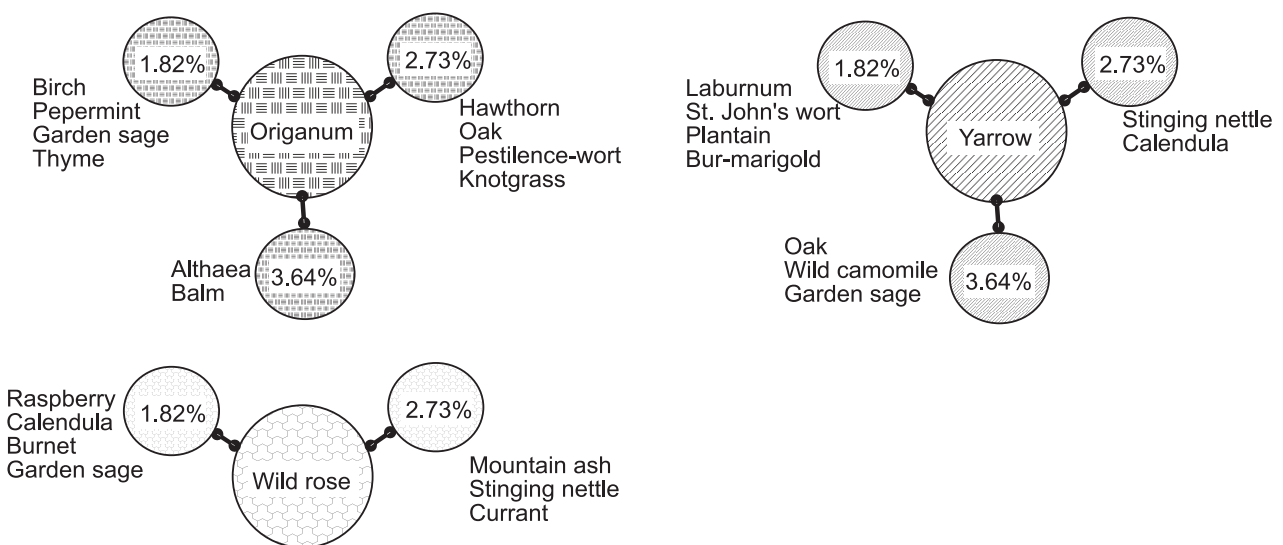


Fig. 4. The combinations of medicinal plants from group 3 in collections

CONCLUSIONS

1. 110 herbal collections of folk and traditional medicine have been analyzed. It has been determined that the prescriptions containing plants of *Asteraceae* and *Rosaceae* families are recommended for the treatment of dental diseases; they consist of 4-6 ingredients, but the dominant types of the raw material are the overground parts

such as herbs (30.15%) and leaves (17.65%).

2. It has been found in the composition of collections the most frequently used plants are garden sage (28.18%), wild chamomile (24.55%), oak (19.09%), calendula (19.09%), St. John's wort (12.73%), sedge (12.73%), stinging nettle (11.82%), thyme (10.00%), common yarrow (9.09%), common ori-

ganum (9.09%), wild rose (9.09%), for which stable combinations of plant components are represented in a collection with them.

3. The approaches to the search of promising plants that can be used for scientific evidence of the composition of phytomedicines, among which there are collections for dental practice, have been outlined.

REFERENCES

1. Грушина Н.С. Воспалительные заболевания: лечение народными средствами. – Ростов н/Д. : Феникс, 2007. – 416 с.
2. Данилевский Н.Ф., Зинченко Т.Д., Кодола Н.А. Фитотерапия в стоматологии. – К.: Здоров'я, 1984. – 176 с.
3. Енциклопедія народної медицини (описи захворювань, рецепти) / Укл. і відп. ред. О. Михайлевський. – Бережани: ПП Михайлевський, 2008. – 1284 с.
4. Шульга Л.І. // Запорозький мед. журн. – 2013. – №2 (77). – С. 104-108.
5. Шульга Л.І., Пімінов О.Ф., Ролік С.М. // Укр. вісник психоневрол. – 2009. – Т. 17, №2. – С. 109-110.
6. Ameh Sunday J., Obodozie Obiageli O., Inyang Uford S. et al. // J. of Med. Plants Res. – 2010. – Vol. 4 (2). – P. 72-81.
7. Panda S.K., Rout S.D., Mishra N., Panda T. // J. of Pharmacognosy and Phytotherapy. – 2011. – Vol. 3 (7). – P. 101-113.
8. Shulga L.I., Biryukova S.V., Piminov O.F. // Ann. of Mechnikov Institute [Електр. ресурс]. – 2011. – №1. – P. 30-33.
9. <http://travolechenie.com/>
10. http://www.natadent.ru/info/info_59.html
11. http://medicalplant.ru/16_1.shtml

СУЧАСНІ ПІДХОДИ ДО МУЛЬТИВЕКТОРНОГО ПОШУКУ ПЕРСПЕКТИВНИХ РОСЛИННИХ ОБ'ЄКТІВ ДЛЯ НОВИХ ЛІКАРСЬКИХ ЗАСОБІВ

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Ключові слова: методологія; фітопрепарати; розробка складу; лікарська рослинна сировина

Представлена робота присвячена відображенню можливих підходів до пошуку перспективних рослинних об'єктів для створення нових лікарських засобів рослинного походження та їх реалізації на прикладі зборів для стоматологічної практики. Із джерел народної та офіційної медицини було відібрано і проаналізовано 110 прописів, які використовуються при лікуванні запальних захворювань пародонту і слизової оболонки порожнини рота. Встановлено належність рослинних компонентів зборів, що досліджувалися, до родин Айстрові (16,39%), Розові (11,48%), Ясноткові (9,02%), Селерові (6,56%). Розраховано число рослинних складових у прописах, за результатами підрахунків виявлено домінування групи з кількістю інгредієнтів 4-6. При розгляді рослин у композиціях за видом сировини відзначено, що у складі зборів частіше прописані надземні частини (трави – 30,15%, листя – 17,65%). У досліджуваних зборах за рейтингом вживаності визначено 11 найбільш поширених інгредієнтів: шавлія лікарська, ромашка лікарська, дуб звичайний, нагідки лікарські, звіробій звичайний, лепеха звичайна, кропива дводомна, чебрець звичайний, деревій звичайний, материнка звичайна, шипшина звичайна. Для означеного переліку лікарських рослин згруповані сталі поєднання з іншими рослинними компонентами в межах одного збору, які представлені схематично. Наведені шляхи проведення досліджень разом з одержаними даними щодо пошуку перспективних рослин можуть бути використані для наукового обґрунтування складів багатоконпонентних лікарських препаратів на основі лікарської рослинної сировини, призначених для фармакотерапії ряду патологічних станів, зокрема запальних стоматологічних хвороб.

СОВРЕМЕННЫЕ ПОДХОДЫ К МУЛЬТИВЕКТОРНОМУ ПОИСКУ ПЕРСПЕКТИВНЫХ РАСТИТЕЛЬНЫХ ОБЪЕКТОВ ДЛЯ НОВЫХ ЛЕКАРСТВЕННЫХ СРЕДСТВ**А.Ф.Пиминов, Л.И.Шульга, Т.С.Безценная****Институт повышения квалификации специалистов фармации Национального фармацевтического университета***Ключевые слова: методология; фитопрепараты; разработка состава; лекарственное растительное сырье*

Представленная работа посвящена отображению возможных подходов к поиску перспективных растительных объектов для создания новых лекарственных средств растительного происхождения и их реализации на примере сборов для стоматологической практики. Из источников народной и официальной медицины отобраны и проанализированы 110 прописей, используемых в лечении воспалительных заболеваний пародонта и слизистой оболочки полости рта. Установлена принадлежность растительных компонентов исследуемых сборов к семействам Астровые (16,39%), Розовые (11,48%), Яснотковые (9,02%), Сельдерейные (6,56%). Рассчитано число растительных составляющих в прописях и по результатам подсчетов выявлено преобладание группы с количеством ингредиентов 4-6. При рассмотрении растений в композициях относительно вида сырья отмечено, что в составе сборов чаще прописаны надземные части (трава – 30,15%, листья – 17,65%). В исследуемых сборах по рейтингу применяемости определены 11 наиболее распространенных ингредиентов: шалфей лекарственный, ромашка лекарственная, дуб обыкновенный, календула лекарственная, зверобой продырявленный, аир обыкновенный, крапива двудомная, тимьян обыкновенный, тысячелистник обыкновенный, душица обыкновенная, шиповник. Для установленного перечня лекарственных растений сгруппированы постоянные сочетания с другими растительными компонентами в пределах одного сбора, которые представлены схематично. Указанные пути проведения исследований совместно с полученными данными по поиску перспективных растений могут быть использованы для научного обоснования составов многокомпонентных лекарственных препаратов на основе лекарственного растительного сырья, предназначенных для фармакотерапии ряда патологических состояний, в частности воспалительных стоматологических болезней.

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