

# Medicinal Plants Used for the Treatment of Bronchial Asthma in Russia and Central Asia

Nazim Mamedov  
Lyle E. Craker

**ABSTRACT.** Over 200 different species of plants from the former Soviet Union have been used in the traditional or conventional treatment of bronchial asthma. This paper reviews crude plant extracts and botanical drug formulas used in the former Soviet Union for the treatment of bronchial asthma and other respiratory allergic diseases. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: <getinfo@haworthpressinc.com> Website: <http://www.HaworthPress.com> © 2001 by The Haworth Press, Inc. All rights reserved.]

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## INTRODUCTION

Bronchial asthma, a chronic, allergic disease characterized by repeated spasms of the bronchi and edema of bronchial mucous membranes, is caused by sensitivity of the body, particularly the bronchial tissues, to various, usually harmless, substances called allergens. Frequently, these allergens are common materials such as household and industrial dust, pollen, fungal spores, domestic animal hair and dander,

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Nazim Mamedov and Lyle E. Craker are affiliated with Laboratories for Natural Products, Medicinal and Aromatic Plants, University of Massachusetts, Amherst, MA 01003 USA.

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and microorganisms inhabiting the upper respiratory tract and bronchi. Typically, an asthma attack begins when an allergen interacts with cellular tissue, triggered by allergens, air pollution, cold air, drugs, emotional stress, infections, vigorous exercise, and numerous other substances and conditions. The cells lining the air passages swell and secrete excess mucus that is thick and sticky, clogging the air passages (6,28,66,81).

Although an initial asthma episode may subside, changes in the airway frequently follow. More prolonged or severe episodes may follow the first episode. In the second episode, the air passages are narrowed more extensively and the victim generally has great difficulty in breathing. The second episode may last for 24 hours or longer and appears to make the airways even more sensitive to substances that trigger an asthma attack (6,20,28,63,66,81).

Current treatments for asthma consist of either avoidance of the initiating agent or treatment with drugs. The initiating agent is generally identified by observations of the victim or by the use of allergic diagnostic or skin sensitivity tests. If the allergen is discovered, the patient (victim) is encouraged to eliminate the source by changes in profession, modification of living conditions, treatment of infections, reduction in stress, or other action that separates the patient from the allergen. Desensitization to allergens can sometimes be achieved using injections of allergen extract over periods of time. Breathing exercises may also be recommended. Drug treatment generally consists of bronchodilators to relax the muscles in the airway wall, corticosteroids to reduce inflammation and the overactive respiratory system, and cromolyn-like drugs to lessen the lung response to asthma triggers (6,20,28,63,66,81).

More than 50 million Americans, one of every five, suffer from asthma, hay fever, or other allergic diseases (66). Indeed, asthma is the third-ranking cause of hospitalization among children under 15 years of age and causes untold suffering to both children and adults who gasp for breath and fear possible future attacks. The annual costs (direct and indirect) associated with asthma in the United States has been estimated at more than \$6.2 billion (66). Similar costs of asthma are noted in other countries. During the last 30 years in Russia and Central Asian countries of the former Soviet Union, increasing numbers of asthma patients have been also diagnosed. According to official statistics for urban areas of the former Soviet Union, bronchial asthma exists at a rate of 5.4 cases for each 10,000 inhabitants. Seven people of every 100,000 are completely disabled by the disease (53,76,80). In addition, the disease frequently complicates other afflictions such as pulmonary emphysema (6,28,66,81).

Medicinal plants have been used in traditional medicine to treat asthma in several countries, including China, India, Korea, Japan, Russia and other former countries of the USSR for many years. The treatment of asthma with medicinal plants has been common in the Central Asian countries of Uzbekistan, Turkmenistan, Kazakhstan, Kirgizstan, Tadjikistan, and Azerbaijan for over 1000 years, introduced with the 6th century Arab conquest of the Middle East and Central Asia.

Beginning in the first millennium A.D., a number of scientists and physicians made important contributions to the treatment of bronchial asthma. Islamic medicine treatments, adopted from the early Greek physicians, were developed by prominent Central Asian scholars, including Al-Razi (Rhazes), Al-Biruni, and Bin Sina (Avicenna) (1,2,33, 42-44,54). In 1190, Mamnoides, a rabbi and physician in the palace of Arabian Sultan Saladin recognized that asthma tended to run in families (81). In 1712, Muhammed Shirvani wrote that asthma and allergy diseases are related to the nervous system and indicated 50 plants useful in the treatment of asthma (24,55). Grinevich (30) and Brekhman (12,13,14,15,16) synthesized the work of earlier scientists and traditional healers. Through an informational screening process using references on traditional medicine of East Asia, these researchers have identified the major medicinal plants for treatment of bronchial asthma within this area (Table 1).

## APPLICATIONS

Of the known 17,600+ species of plants known to grow in countries of the former Soviet Union, some 2,500 have been considered as medicinal plants and used in traditional medicines. The official medical system of the Soviet Union classified 260 species as medicinal plants for use in galenicals and as supplements with synthetic compounds (76,78). Because of the costs of synthetic pharmaceuticals, the former Soviet Union developed a dependency on medicinal plants as phytopharmaceuticals for use in the primary medicinal system of the country. This dependence on natural products as medicines has continued within former republics of the USSR.

Considerable research efforts in the use of medicinal plants were made by the Soviet Union following World War II. As a result, 60 to 70 percent of the health care products in the former Soviet Union are based on extracts and formulations of plant origin (10,77,78). The importance of medicinal and aromatic plants in Russia is evidenced by the approxi-

TABLE 1. Traditional medicinal plants used in bronchial asthma therapy in East Asia.

Plant	Plant part
<i>Aristolochia debilis</i> Siebold et Zucc.	Roots & seeds
<i>Asarum sieboldii</i> Mig.	Rhizome
<i>Brassica hirta</i> L.	Seeds
<i>Citrus nobilis</i> Lour.	Fruit peels
<i>Cordyceps sinensis</i> (Berk.) Sacc.	Hypha
<i>Corydalis ambigua</i> Cham. et Schlecht.	Tubers
<i>Datura stramonium</i> L.	Leaves
<i>Ephedra equisetina</i> Bunge	Branches
<i>Ephedra sinica</i> auct.	Branches
<i>Euphorbia sieboldiana</i> Morr. et Decne	Roots
<i>Ginkgo biloba</i> L.	Bark, leaves, & seeds
<i>Glycyrrhiza glabra</i> L.	Root

mately 60 species under cultivation on state farms and former cooperatives (77,78). The most important growing regions within former Soviet Union, in terms of numbers of cultivated medicinal plants is Central Asia, which includes the Caucasus region, and the Russian Far East (32,46,65,74,75). Due to climatic diversity, almost each former Soviet republic is known for certain types of plant species and specializes in medicinal herb production.

Over 200 different plant species representing 55 plant families can be identified as having been used in traditional and conventional treatment of bronchial asthma in countries of the former Soviet Union (Table 2). Some plant materials, such as *Vaccinium vitisidae*, used for treatment of asthma in Russia are noted for inducing antihistamine activity (25). A large number of these plants, such as *Lavandula*, *Thymus*, *Nepeta*, *Origanum*, *Patrinia*, and *Ziziphora* spp., are known for essential oil content. Some plants, such as *Allium*, *Alliaria*, *Rosa*, *Primula*, *Punica*, and *Rubus* spp., can be identified as ascorbic acid containing plants. Others contain a variety of chemical constituents. A survey of traditional medicines for asthma by Nicolayeva (60), identified 43 medicinal plants frequently used in bronchial asthma therapy.

A select group of 29 plants are most commonly used in treatment of bronchial asthma in Russia and Central Asian countries (Table 3).

TABLE 2. Plant materials used for treatment of bronchial asthma.

Plant material	Plant part	Preparation	Reference
<b>Amaryllidaceae</b>			
<i>Galanthus woronowii</i> Losinsk.	Bulbs	Galenic	22,26,34,78
<i>Ungernia sewertzowii</i> (Regel) B.Fedtsch. <sup>1</sup>	Leaves	Galenic	9,21,34
<i>Ungernia victoris</i> Vved. <sup>1</sup>	Leaves	Galenic	9,21,26,34
<b>Anacardiaceae</b>			
<i>Pistacia vera</i> L.	Seeds	Eat or make galenic	22,23,26,27,45,55
<b>Apiaceae</b>			
<i>Angelica archangelica</i> L.	Root & rhizomes	Galenic	26,34,78
<i>Carum carvi</i> L.	Fruit	Galenic	1,2,22,24,26,34,45,55,57,67
<i>Cuminum cyminum</i> L.	Fruit	Galenic	1,2,24,45,55,67
<i>Eryngium planum</i> L.	Leaves, stems, & flowers	Galenic	48,59,78
<i>Ferula assa-foetida</i> L.	Roots	Sap	26,34,36,52,67
<i>Ferula galbanifera</i> Boiss. et Buh.	Root & stem	Sap	26,67,78
<i>Ferula sumbul</i> Hook. <sup>2</sup>	Roots	Sap	1,2,26,78
<i>Foeniculum vulgare</i> Mill.	Fruit	Galenic & essential oil	1,2,22,23,24,45,55,64,67,76
<i>Heracleum asperum</i> H. Sosnovskii	Leaves & root	Galenic	22,24,27,45,55
<i>Heracleum lanatum</i> Michx.	Fruit & roots	Galenic	24,45,52,55,65,70
<i>Pastinaca sativa</i> L.	Fruit	Tablets of tissue (drug Pastinacinumm)	22,24,45,49,57,67,76

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Apiaceae (continued)</b>			
<i>Pimpinella anisum</i> L. <sup>3</sup>	Fruit	Galenic & essential oil	9,22,37, 45,49, 67
<i>Pimpinella saxifraga</i> L.	Fruit & roots	Galenic & essential oil	21,22,24,45,55
<i>Visnaga daucoides</i> Gaertn.	Fruit & flowers	Galenic	49,57,78
<b>Araceae</b>			
<i>Acorus calamus</i> L.	Rhizomes	Galenic or powder	9,26,34,78
<b>Asteraceae</b>			
<i>Arnica chamissonis</i> Less.	Flowers	Galenic	9,49,57
<i>Arnica foliosa</i> Nutt.	Flowers & leaves	Galenic	9,49,57
<i>Arnica montana</i> L.	Flowers	Galenic	9,34,49,57
<i>Artemisia cina</i> Berg. ex Poljak. <sup>2</sup>	Flower blossoms & leaves	Galenic	34,49,57,67,78
<i>Artemisia daghestanica</i> Krasch. et Poretzky <sup>4</sup>	Herb	Galenic	32,46,48
<i>Artemisia santolina</i> Schrenk.	Herb	Galenic	73,78
<i>Artemisia siversiana</i> Willd.	Herb	Galenic	65,78
<i>Artemisia taurica</i> Willd.	Herb	Galenic	26,78
<i>Artemisia vulgaris</i> L.	Herb	Galenic	22,26,32,45,78
<i>Helichrisum arenarium</i> (L.) Moench.	Flowers	Galenic	22,26,34,45,49, 55,57,59,67,76, 78,
<i>Helichrisum plicatum</i> DC.	Flowers	Galenic	22,34,45,50,51, 55,78
<i>Inula britannica</i> L.	Roots & rhizomes	Decoction	45,50,51,57,78

Plant material	Plant part	Preparation	Reference
<b>Asteraceae (continued)</b>			
<i>Inula helenium</i> L.	Roots & rhizomes	Decoction	22,34,45,49,57,67,73,76,77,78
<i>Inula japonica</i> Thunb.	Roots & rhizomes	Decoction	34,65,78
<i>Matricaria chamomilla</i> L.	Flowers	Galenic	22,34,45,49,67,76
<i>Petasites albus</i> (L.) Gaertn.	Leaves	Fresh tissue & galenic from fresh tissue	26,32,78
<i>Petasites officinalis</i> Moench.	Leaves	Fresh tissue & galenic from fresh tissue	48,57,59,78
<i>Petasites tomentosus</i> DC.	Leaves	Fresh tissue & galenic from fresh tissue	57,78
<i>Senecio platyphylloides</i> Somm. et Lev.	Shoots, roots, & rhizomes	Galenic	21,22,34,45,50,57
<i>Senecio rhombifolius</i> (Willd.) Sch. Bip.	Shoots, roots, & rhizomes	Galenic	21,22,34,45,50,57
<i>Senecio vernalis</i> Waldst. et Kit.	Shoots, roots, & rhizomes	Galenic	21,45,48,50,51,79
<i>Senecio vulgaris</i> L.	Shoots, roots, & rhizomes	Galenic	21,45,48,50,51,79
<i>Tussilago farfara</i> L.	Leaves & flowers	Galenic	22,34,49,50,51,57,77,78
<b>Berberidaceae</b>			
<i>Caulophyllum robustum</i> Michx.	Root & rhizomes	Galenic	62,65,78
<b>Boraginaceae</b>			
<i>Cynoglossum officinale</i> L.	Leaves & roots	Galenic	26,34,48,78
<i>Echium vulgare</i> L.	Leaves, stem, & flowers	Galenic	26,34,48,78

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Brassicaceae</b>			
<i>Alliaria petiolata</i> (Bieb.) Cavara et Grande	Stems & leaves	Galenic	34,78
<b>Caprifoliaceae</b>			
<i>Sambucus racemosa</i> L.	Flowers	Galenic	9,48,57,78
<i>Sambucus nigra</i> L.	Flowers	Galenic	9,26,78
<b>Caryophyllaceae</b>			
<i>Acanthophyllum glandulosum</i> Bunge	Root	Galenic	57,73,78
<i>Acanthophyllum gypsophiloides</i> Regel	Root	Galenic	34,57,78
<i>Acanthophyllum paniculatum</i> Regel.	Root	Galenic	57,78
<i>Stellaria media</i> (L.) Vill.	Leaves, stems, & flowers	Galenic	22,24,45,78
<i>Herinaria glabra</i> L.	Leaves & flowers	Galenic	22,34,45,73,78
<b>Chenopodiaceae</b>			
<i>Chenopodium botris</i> L.	Leaves & inflorescences	Galenic	34,36,40,48,78
<b>Crassulaceae</b>			
<i>Rhodiola rosea</i> L.	Roots & rhizomes	Galenic	9,26,31,76,77, 78
<b>Datisceae</b>			
<i>Datisca cannabina</i> L.	Leaves & flowers	Galenic	45,48,65,78
<b>Droseraceae</b>			
<i>Drosera anglica</i> Huds.	Leaves, stems, & flowers	Galenic	26,34,48,73,78
<i>Drosera intermedia</i> Hayne	Leaves, stems, & flower	Galenic	26,48,73,78



Plant material	Plant part	Preparation	Reference
<b>Droseraceae (continued)</b>			
<i>Drosera rotundifolia</i> L.	Leaves, stems, & flowers	Galenic	26,34,48,73,78
<b>Ephedraceae</b>			
<i>Ephedra distachya</i> L.	Stems, strobilous, & berries	Galenic	22,26,34,36,45, 73
<i>Ephedra equisetina</i> Bunge	Stems, strobilous, & berries	Galenic	9,26,34,49,57, 67,76
<i>Ephedra fedtschenkoae</i> Pauls.	Stems, strobilous, & berries	Galenic	26,36,73
<i>Ephedra intermedia</i> Schrenk et C.A. Mey.	Stems, strobilous, & berries	Galenic	22,26,34,36,45, 57,73
<i>Ephedra kokanica</i> Regel	Stems, strobilous, & berries	Galenic	36,73,78
<i>Ephedra lomatolepis</i> Schrenk	Stems, strobilous, & berries	Galenic	36,73,78
<i>Ephedra monosperma</i> C.A. Mey.	Stems, strobilous, & berries	Galenic	26,37,73,78
<i>Ephedra procera</i> Fish. et Mey.	Stems, strobilous, & berries	Galenic	22,26,36,45,57, 73,78
<i>Ephedra strobilaceae</i> Bunge	Stems, strobilous, & berries	Galenic	36,73,78
<b>Equisetaceae</b>			
<i>Equisetum arvense</i> L.	Stems	Galenic	26,34,49,57,58, 76
<b>Ericaceae</b>			
<i>Ledum palustre</i> L.	Leaves & flowers	Galenic	26,34,49,57,76, 78
<i>Ledum latifolium</i> Jacq.	Leaves & flowers	Galenic	26,47,78

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Fabaceae</b>			
<i>Glycyrrhiza aspera</i> Pall.	Roots & rhizomes	Galenic	5,21,22,36,45, 55,78
<i>Glycyrrhiza echinata</i> L.	Roots & rhizomes	Galenic	22,32,45,78
<i>Glycyrrhiza glabra</i> L.	Root	Galenic	1,2,5,9,21,24, 26,30,34,45, 49,55,61,62, 71,76,78
<i>Glycyrrhiza glandulifera</i> Waldst. et Kit.	Roots & rhizomes	Galenic	21,22,32,45, 55,78
<i>Glycyrrhiza korshynskyi</i> Grig.	Roots & rhizomes	Galenic	36,34,78
<i>Glycyrrhiza uralensis</i> Fish.	Roots & rhizomes	Galenic	5,29,34,49,57, 62,78
<i>Hedysarum alpinum</i> L.	Stems, leaves, & flowers	Galenic	9,26,49,73,78
<i>Hedysarum flavescens</i> Regel et Schmalh.	Stems, leaves, & flowers	Galenic	9,36,78
<i>Thermopsis alterniflora</i> Regel et Schmalh. <sup>2</sup>	Stems, leaves, flowers, & fruit	Galenic	49,57,78
<i>Thermopsis lanceolata</i> R. Br.	Stems, leaves, flowers, & fruit	Galenic	34,49,57,67, 76,78
<i>Thermopsis turkestanica</i> Gand.	Stems, leaves, flowers, & fruit	Galenic	34,57,67,76,78
<i>Trifolium pratense</i> L.	Leaves & flower blossoms	Galenic	22,26,45,65, 67,78
<i>Trigonella foenum graecum</i> L.	Seeds	Eat powdered tissue	1,22,24,45,52, 55,67

Plant material	Plant part	Preparation	Reference
<b>Gentianaceae</b>			
<i>Gentiana cruciata</i> L.	Roots & rhizomes	Galenic	22,45,78
<i>Gentiana gelida</i> Bieb.	Roots & rhizomes	Galenic	22,45,78
<i>Gentiana lutea</i> L.	Roots & rhizomes	Galenic	22,34,45,49,69,78
<i>Gentiana punctata</i> L.	Roots & rhizomes	Galenic	22,34,45,78
<i>Gentiana schistocalyx</i> C. Koch	Roots & rhizomes	Galenic	22,45,78
<i>Gentiana septemfida</i> Pall	Roots & rhizomes	Galenic	22,45,78
<b>Grossulariaceae</b>			
<i>Ribes nigrum</i> L.	Leaves & fruit	Galenic or eat fruit tissue	22,26,34,45,49,57,58,73
<b>Hypericaceae</b>			
<i>Hypericum perforatum</i> L.	Stems, leaves, & flowers	Tinctures & decoctions	22,26,34,45,49,57,67,76
<b>Hyperziaceae</b>			
<i>Licopodium selago</i> L.	Leaves	Galenic	26,78,79
<b>Iridaceae</b>			
<i>Crocus sativum</i> L.	Stamens	Galenic	9,22,26,24,45,55
<i>Iris germanica</i> L.	Rhizomes	Galenic	26,34,78
<i>Iris pseudocarus</i> L.	Rhizomes	Galenic	34,57,73,78
<i>Iris versicolor</i> L.	Rhizomes	Galenic	48,78
<b>Lamiaceae</b>			
<i>Betonica foliosa</i> Rupr. <sup>2</sup>	Stems, leaves, & flowers	Galenic	26,34,49,78
<i>Betonica officinalis</i> L.	Stems, leaves, & flowers	Galenic	26,34,48,78

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Lamiaceae (continued)</b>			
<i>Hyssopus officinalis</i> L.	Leaves	Galenic	26,34,48,78
<i>Marrubium vulgare</i> L.	Leaves & flowers	Galenic	23,48,78
<i>Melissa officinalis</i> L.	Leaves	Galenic	26,34,49,67
<i>Mentha</i> × <i>piperita</i> L. <sup>5</sup>	Leaves	Essential oil	49,57,62
<i>Mentha pulegium</i> L.	Leaves	Essential oil	34,49,57,62
<i>Nepeta cataria</i> L.	Stems, leaves, & flowers	Galenic	22,34,52,45,63,67,78
<i>Nepeta grandiflora</i> M.B.	Stems, leaves, & flowers	Galenic	35,45,48,78
<i>Nepeta mussini</i> Spreng.	Stems, leaves, & flowers	Galenic	35,45,48,78
<i>Nepeta racemosa</i> Lam.	Stems, leaves, & flowers	Galenic	35,45,48,78
<i>Origanum koppeltdaghense</i> Boriss.	Stems, leaves, & flowers	Galenic	26,48,73,78
<i>Origanum tyttanthum</i> Gontsch.	Stems, leaves, & flowers	Galenic	26,34,48,73,78
<i>Origanum vulgare</i> L.	Stems, leaves, & flowers	Galenic	22,23,26,34,45,49,57,67,73,76,78
<i>Phlomis tuberosa</i> L.	Leaves & inflorescences	Galenic	23,64,78
<i>Rosmarinus officinalis</i> L.	Leaves	Galenic & powder made into antiasthmatic cigarettes	22,45,49,52,57,78
<i>Scutellaria baicalensis</i> Georgi	Roots	Galenic	5,9,26,30,34,49,57,69,76

Plant material	Plant part	Preparation	Reference
<b>Lamiaceae (continued)</b>			
<i>Thymus marschallianus</i> Willd.	Stems, leaves, & flowers	Galenic of roots in combination with <i>Lemnaa minor</i> , <i>Ephedra equisetina</i> , & <i>Datura stramonium</i>	26,34,57,67
<i>Thymus kotschyanus</i> Boiss. et Hohen.	Stems, leaves, & flowers	Galenic	22,26,35,45,52
<i>Thymus nummularius</i> M.B.	Stems, leaves, & flowers	Galenic	35,45
<i>Thymus serpyllum</i> L.	Stems, leaves, & flowers	Galenic	22,26,34,45,49, 57,67
<i>Thymus vulgaris</i> L.	Stems, leaves, & flowers	Galenic	22,26,35,36,45, 49,57,76
<i>Ziziphora bungeana</i> Zuz.	Leaves & blossom clusters	Galenic	23,37,52,78
<i>Ziziphora capitata</i> L.	Leaves & blossom clusters	Galenic	22,37,52,78
<i>Ziziphora clinopodioides</i> Lam.	Leaves & blossoms	Galenic	23,78
<i>Ziziphora rigida</i> (Boiss.) Stapf.	Leaves and blossom clusters	Galenic	22,23,45,78
<i>Ziziphora serpyllaceae</i> Bieb.	Leaves and blossom clusters	Galenic	23,45,78
<i>Ziziphora tenuior</i> L.	Leaves & blossom clusters	Galenic	22,45,78

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Lemnaceae</b>			
<i>Lemna minor</i> L.	Entire plant	Galenical	19,39,64,70,78
<i>Lemna trisulca</i> L.	Entire plant	Galenical	19,39,70,78
<b>Liliaceae</b>			
<i>Allium cepa</i> L.	Leaves & bulbs	Eat tissue mixed with honey	49,57,67,76
<i>Allium sativum</i> L.	Bulbs	Drink tissue extract	22,45,49,55,57,76
<i>Allium ursinum</i> L.	Leaves & bulbs	Eat tissues	22,34,45,67,73
<i>Allium victorialis</i> L.	Leaves & bulbs	Eat tissues	22,34,45,49,67
<i>Fritillaria kamchatcensis</i> (L.) Fish. ex Hook	Tuber	Eat tissue	34,64,78
<i>Fritillaria meleagroides</i> Patrin ex Shult. et Shult.	Tuber	Eat tissue	34,78
<i>Fritillaria raddeana</i> Regel	Tuber	Eat tissue	34,36,78
<i>Gagea lutea</i> (L.) Ker.-Gawl	Bulbs	Galenical	23,78
<b>Lobeliaceae</b>			
<i>Lobelia inflata</i> L. <sup>6</sup>	Stems, leaves, & flowers	Galenical	48,49,57,67,78
<i>Lobelia sessifolia</i> Lamb.	Stems, leaves, & flowers	Galenical	34,48,78
<b>Malvaceae</b>			
<i>Althaea officinalis</i> L.	Roots	Galenical	22,26,34,45,49,57,67,76
<i>Althaea armeniaca</i> Ten.	Roots	Galenical	22,26,34,36,45
<i>Malva sylvestris</i> L.	Flowers	Galenical	22,26,45,55
<b>Menyanthaceae</b>			
<i>Menyanthes trifoliata</i> L.	Leaves	Galenical	22,26,34,45,49,57,58,67,76

Plant material	Plant part	Preparation	Reference
<b>Moraceae</b>			
<i>Ficus carica</i> L.	Fruit	Galenic & eat fruit	9,24,45,55,57
<b>Myrtaceae</b>			
<i>Eucalyptus globulus</i> Labill. <sup>7</sup>	Leaves	Essential oil	22,45,49,57,67,76
<b>Orchidaceae</b>			
<i>Gymnadenia conopsea</i> (L.) R. Br.	Root nodule	Galenic	26,57,73,78
<b>Papaveraceae</b>			
<i>Glaucium flavum</i> Crantz.	Stems, leaves, & flowers	Galenic	34,45,49,57,71,76,78
<b>Passifloraceae</b>			
<i>Passiflora incarnata</i> L.	Herb	Galenic and eat fruit	49,57,76,78
<b>Pinaceae</b>			
<i>Pinus eldarica</i> Medw. <sup>8</sup>	Buds, needles, resin, & tar	Galenic of bud tissue & decoction of other tissues	22,34,45,55
<i>Pinus funebris</i> Kom.	Buds, needles, resin, & tar	Galenic of bud tissue & decoction of other tissues	26,34,48,78
<i>Pinus hamata</i> (Stev.) Sosn.	Buds, needles, resin, & tar	Galenic of bud tissue & decoction of other tissues	26,34,48,78
<i>Pinus kochiana</i> Klotzsch.	Buds, needles, resin, & tar	Galenic of bud tissue decoction of other tissues	22,26,45
<i>Pinus pallasiana</i> D. Don	Buds, needles, resin, & tar	Galenic of bud tissue & decoction of other tissues	26,34,48,78
<i>Pinus pityusa</i> Stev.	Buds, needles, resin, & tar	Galenic of bud tissue & decoction of other tissues	26,34,48,78

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Pinaceae (continued)</b>			
<i>Pinus sabiniana</i> Dougl.	Buds, needles, resin & tar	Galenical of bud tissue & decoction of other tissues	57,78
<i>Pinus silvestris</i> L.	Buds, needles, resin & tar	Galenical of bud tissue & decoction of other tissues	22,26,34,45,49, 57,67,76
<b>Plantaginaceae</b>			
<i>Plantago lanceolata</i> L.	Leaves & seeds	Juice from leaves & decoction from seeds	22,26,34,45
<i>Plantago major</i> L.	Leaves	Juice & tincture	22,26,34,45,49, 57,67,76
<i>Plantago media</i> L.	Leaves	Galenical	22,26,45,55
<i>Plantago psyllium</i> L.	Leaves	Juice & tincture	26,34,49,76
<b>Polemoniaceae</b>			
<i>Polemonium coeruleum</i> L.	Roots & rhizomes	Galenical	26,34,49,57,76
<b>Polygonaceae</b>			
<i>Rumex acetosa</i> L.	Leaves, seeds, & roots	Juice from leaves & extract of seeds & roots	34,67,73,76,78
<i>Rumex alpestris</i> Jacq.	Leaves, seeds, & roots	Galenical	45,54,73
<i>Rumex alpinus</i> L.	Leaves, roots, & rhizomes	Juice from leaves & extract of roots & rhizomes	34,45,73,78
<i>Rumex aquaticus</i> L.	Leaves & roots	Galenical	34,64,73,78
<i>Rumex crispus</i> L.	Leaves & roots	Galenical	22,45,78



Plant material	Plant part	Preparation	Reference
<b>Polygonaceae (continued)</b>			
<i>Rumex gmelinii</i> Tucz. ex Ledeb.	Leaves, roots, & rhizomes	Juice from leaves & extract of roots & rhizomes	48,73,78
<i>Rumex jacutensis</i> Kom.	Leaves & roots	Galenic	48,73,78
<i>Rumex patientia</i> L.	Leaves, roots, & seeds	Galenic	26,34,48,78
<i>Rumex sibiricus</i> Hult.	Leaves & roots	Galenic	64,73,78
<i>Rumex thysiflorus</i> Fingerh	Leaves & roots	Galenic	34,48,73,78
<i>Rumex tianshanicus</i> Losinsk.	Leaves, roots, & rhizomes	Juice from leaves & extract of roots & rhizomes	7,37,73,78
<b>Polygalaceae</b>			
<i>Polygala amarella</i> Grantz	Root	Galenic	34,78,79
<i>Polygala anatolica</i> Boiss. et Heldr.	Roots	Galenic	22,45,78
<i>Polygala hohenackeriana</i> Fish. et Mey.	Roots	Galenic	22,45,78
<i>Polygala kamschatica</i> Maxim.	Roots	Galenic	34,48,65,78
<i>Polygala sibirica</i> L.	Roots	Galenic	26,34,48,78
<i>Polygala tenuifolia</i> Willd.	Roots	Galenic	22,26,34,45,78
<b>Pomoideae</b>			
<i>Cydonia oblonga</i> Mill.	Leaves & seeds	Galenic	22,24,45,55,67
<b>Primulaceae</b>			
<i>Primula heterochroma</i> Stapf.	Roots & rhizomes	Galenic	22,45,48,78
<i>Primula macrocalyx</i> Bunge	Roots & rhizomes	Galenic	22,34,45,78
<i>Primula veris</i> L.	Roots & rhizomes	Galenic	22,26,34,45,78
<i>Primula woronowii</i> A. Losinsk.	Roots & rhizomes	Galenic	22,34,45,76,78

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Pulmonaceae</b>			
<i>Pulmonaria officinalis</i> L.	Leaves	Galenical	26,48,78
<b>Punicaceae</b>			
<i>Punica granatum</i> L.	Fruit	Juice from fruit	22,23,24,26,45,55,76
<b>Ranunculaceae</b>			
<i>Paeonia anomala</i> L.	Roots & rhizomes	Galenical	1,22,26,34,37,45,49,57,76,78
<i>Paeonia mlokosewitschii</i> Lomak.	Roots & rhizomes	Galenical	22,26,45,78
<i>Paeonia obovata</i> Maxim.	Roots & rhizomes	Galenical	26,64,78
<i>Paeonia tenuifolia</i> L.	Roots & rhizomes	Galenical	22,26,45,78
<b>Rhamnaceae</b>			
<i>Ziziphus jujuba</i> Mill.	Fruit	Galenical & eat dried fruit	3,24,34,45,48,55,67,78
<b>Rosaceae</b>			
<i>Geum urbanum</i> L.	Roots & rhizomes	Galenical	26,48,59,78
<i>Prunus divaricata</i> Ledeb.	Bark	Galenical	26,34,48,78
<i>Rosa cinnamomea</i> L.	Fruit	Tea	34,57,67,76
<i>Rubus idaeus</i> L.	Leaves & stems	Galenical	22,26,78
<i>Rubus komarovii</i> Nakai	Fruit	Galenical & eat fruit	34,37
<i>Rubus sachalinensis</i> Levl.	Fruit	Galenical & eat fruit	34,47,58,65,73
<b>Rubiaceae</b>			
<i>Asperula odorata</i> L.	Leaves & flowers	Galenical	34,52,78

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Plant material	Plant part	Preparation	Reference
<b>Salicaceae</b>			
<i>Populus tremula</i> L.	Buds	Galenical	22,45,67
<i>Salix alba</i> L.	Bark	Galenical	34,48,78
<i>Salix caprea</i> L.	Leaves, bark, & blossoms	Galenical	22,26,45,48,55,67,78
<i>Salix excelsa</i> S.G. Gmel.	Bark	Galenical	34,48,78
<i>Salix fragilis</i> L.	Bark	Galenical	34,48,78
<b>Scrophulariaceae</b>			
<i>Verbascum densiflorum</i> Bertol.	Flowers	Galenical	26,48,49,78
<i>Verbascum phlamoides</i> L.	Flowers	Galenical	22,26,34,45,55,67
<i>Verbascum speciosum</i> Schrad.	Flowers	Galenical	22,26,34,45,55
<i>Verbascum thapsiforme</i> Schrad.	Flowers	Galenical	26,34
<i>Verbascum thapsus</i> L.	Flowers	Galenical	26,34
<b>Solanaceae</b>			
<i>Atropa belladonna</i> L.	Leaves	Galenical & powder	26,34,49,57,62,76
<i>Datura innoxia</i> Mill.	Leaves & seed	Galenical & leaf powder mixed with <i>Hyoscyamus niger</i> & <i>Atropa belladonna</i> made into antiasthmatic cigarettes	22,45,49,57,76
<i>Datura stramonium</i> L.	Leaves & seeds	Galenical & leaf powder in anitasthmatic cigarettes	22,26,34,45,49,57,67,76
<i>Hyoscyamus bohemicus</i> F.W. Schmidt	Leaves	Powder	22,34,45,48,78
<i>Hyoscyamus camerarii</i> Fisch. et Mey.	Leaves	Powder	22,45,48,78
<i>Hyoscyamus niger</i> L.	Leaves	Powder	22,34,45,48,49,57,67,76,78

PQR

TABLE 2 (continued)

Plant material	Plant part	Preparation	Reference
<b>Solanaceae (continued)</b>			
<i>Solanum laciniatum</i> Ait	Leaves, flowers, & fruit	Galenical	22,45,78
<i>Solanum persicum</i> Willd.	Stems, leaves, flowers, & fruit	Galenical	22,45,78
<b>Urticaceae</b>			
<i>Urtica angustifolia</i> Fisch.	Leaves	Galenical	26,34,65
<i>Urtica dioica</i> L.	Leaves	Galenical	22,26,34,45,49,57,76
<i>Urtica urens</i> L.	Leaves	Galenical	22,26,34,45,57
<b>Vaccinaceae</b>			
<i>Vaccinium vitis-idaea</i> L.	Leaves & berries	Galenical	26,34,49,57,67,76,78
<b>Valerianaceae</b>			
<i>Patrinia intermedia</i> (Horn.) Roem. et Schult.	Roots	Galenical & essential oil	9,18,34,41,48,78
<i>Valeriana officinalis</i> L.	Roots & rhizomes	Galenical	22,24,26,34,45,49,55,57,67,76,78
<i>Valerianella dentata</i> (L.) Poll.	Roots	Galenical	24,45,48,55,77
<b>Violaceae</b>			
<i>Viola arvensis</i> Murr.	Stems, leaves, & flowers	Galenical	22,26,34,45,57,78
<i>Viola tricolor</i> L.	Stems, leaves, & flowers	Galenical	26,34,49,57,76,78
<b>Vitaceae</b>			
<i>Vitis vinifera</i> L. <sup>9</sup>	Fruit	Juice	1,2,22,24,45,55,73,75,76

<sup>1</sup> Plant is endemic to Central Asia [Tyan Shan Mountains, Kirghizstan (9,32)] and Uzbekistan (26).

<sup>2</sup> Plant is endemic to Central Asia, including areas of South Kazakhstan, South Uzbekistan, and North Tadjikistan (26,49,78).

<sup>3</sup> Plant is cultivated in Azerbaijan and South Russia (9,22,49).

<sup>4</sup> Plant is endemic in Daghestan of Caucasian Mountains (32,46).

<sup>5</sup> Plant has been cultivated in Russia since the 18th century (49,57).

<sup>6</sup> Plant native to America, but cultivated in South Russia and regions of North Caucasus (49).

<sup>7</sup> Plant is cultivated in West Georgia, Crimea, and Azerbaijan (49,57).

<sup>8</sup> Plant is endemic for Azerbaijan and Georgia (32).

<sup>9</sup> Plant has been widely cultivated since ancient times in Central Asia, Caucasus, Crimea, and Moldavia (76,78).

TABLE 3. Most commonly used plant material in treatment of asthma.

<i>Atropa belladonna</i> L.	<i>Origanum vulgare</i> L.
<i>Althae officinalis</i> L.	<i>Pimpinella anisum</i> L.
<i>Angelica archangelica</i> L.	<i>Pinus silvestris</i> L.
<i>Cephaelis ipecuanha</i> Willd. <sup>1</sup>	<i>Plantago major</i> L.
<i>Datura innoxia</i> Mill.	<i>Polemonium coeruleum</i> L.
<i>Datura stramonium</i> L.	<i>Polygala sibirica</i> L.
<i>Ephedra equisetina</i> Bunge	<i>Primula veris</i> L.
<i>Foeniculum vulgare</i> Mill.	<i>Senecio platyphylloides</i> Somm. et Lev.
<i>Glaucium falvum</i> Crantz	<i>Thermopsis lanceolata</i> R.Br.
<i>Glycyrrhiza glabra</i> L.	<i>Thymus serpyllum</i> L.
<i>Glycyrrhiza uralensis</i> Fish	<i>Thymus vulgaris</i> L.
<i>Hyssopus officinalis</i> L.	<i>Tussilago farfara</i> L.
<i>Inula helenium</i> L.	<i>Verbascum densiflorum</i> Bertol.
<i>Ledum palustre</i> L.	
<i>Viola tricolor</i> L.	
<i>Marrubium vulgare</i> L.	

<sup>1</sup> *Cephaelis ipecuanha* is imported into former Soviet Union countries from Brazil, Indonesia, and India (9,52).

Based on these plants, 23 phytomedicines have been developed in countries of the former Soviet Union (Table 4). Positive results have been demonstrated in the use of medicinal plants for treatment of bronchial asthma. In a study by Safronova and Boyarskaya (68) involving over 1000 children with bronchial asthma, an aerosol inhalation of an extract of mixed herbs with anti-inflammatory activity proved effective in stopping asthmatic attacks.

Plant materials used in the treatment of asthma in Russia and Central Asian countries are also used in other locations. *Lemna*, *Ephedra*, *Gentiana*, and *Scutellaria* species are frequently used for the treatment of asthma in the traditional medicine systems of China and Tibet (5,11,17,34,39). Medicinal plants from the genera *Fritillaria* are used for the treatment of asthma in the traditional medicine system of Japan (16,72). A common traditional medicinal plant used for treatment of asthma in Russia and several other countries (China, Tibet, Vietnam, Burma, India, Mongolia, Azerbaijan, Turkmenistan, Uzbekistan, Kazakhstan, Kirgizstan, Tadjikistan) is licorice (*Glycyrrhiza glabra*). The anti-asthmatic action of licorice is probably related to the corticosteroidal activity of licorice extracts (56). *Ephedra equisetina*, *Ephedra sinica*, *Datura stramonium*, *Cordyceps sinensis* are also used in traditional medicine of Tibet for asthma (7,8,25,38).

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TABLE 4. Phytomedicine drugs for asthma in former Soviet Union.

Phytomedicine	Plant material
Aeronum	<i>Datura innoxia</i> Mill.
Asthamatinum	<i>Datura innoxia</i> Mill., <i>Datura stramonium</i> L., & <i>Atropa belladonna</i> L.
Asthatolium	<i>Datura innoxia</i> Mill., <i>Datura stramonium</i> L., & <i>Hyoscyamus niger</i> L.
Bronkholitin	<i>Glaucium flavum</i> Crantz
Defedrine	<i>Ephedra equisetina</i> Bunge
Ephedrine	<i>Ephedra equisetina</i> Bunge
Ephedrini hydrochloridum	<i>Ephedra equisetina</i> Bunge
Folium stramonii	<i>Datura innoxia</i> Mill. & <i>Datura stramonium</i> L.
Glaucium hydrochloridum	<i>Glaucium flavum</i> Crantz
Glycyrramum	<i>Glycyrrhiza glabra</i> L.
Infusum fructuum foeniculi	<i>Foeniculum vulgare</i> Mill
Infusum herbae ledi palustris	<i>Ledum palustre</i> L.
Mucaltinum	<i>Althae officinalis</i> L.
Oleum foeniculi	<i>Foeniculum vulgare</i> Mill
Oleum thymi	<i>Thymus vulgaris</i> L.
Palufinum	<i>Senecio platyphylloides</i> Somm. et Lev.
Pectusinum	<i>Mentha × piperita</i> L. & <i>Eucalyptus globulus</i> Labill.
Pertussinum	<i>Thymus serpyllum</i> L.
Plavefinum	<i>Senecio platyphylloides</i> Somm. et Lev.
Scopolamini hydrobromidum	<i>Datura innoxia</i> Mill
Solutan	<i>Atropa belladonna</i> L.
Thepaphyllinum,	<i>Senecio platyphylloides</i> Somm. et Lev.
Urolesan	<i>Origanum vulgare</i> L.

### CONCLUSIONS

Countries of the former Soviet Union have an extensive history of using medicinal plants for treatment of bronchial asthma. A large number of plant species have been used and several of these are currently cultivated in various regions for medicinal purposes. Because asthma initiates mucus plugging, muscle tightening (bronchial constriction), and inflammation, any anti-asthmatic benefits from plant material or extracts most likely decreases one or more of these symptoms. Plants and

plant extracts containing ephedrine, such as *Ephedra equisetina* and *Ephedra intermedia*, may enhance bronchial dilation and help restore free breathing. Steroids are known to reduce inflammation and steroid containing plant materials, such as *Glycyrrhiza glabra*, *Polemonium coeruleum*, *Polygala sibirica*, and *Primula veris*, may be effective during asthma attacks.

In most cases, benefits of treatment with the plant material or extracts can probably be ascribed to antihistamine activity (19,30,60,76). Pharmacological correction of histamine levels is an important aspect of most allergic diseases that may be corrected by some plant extracts (25,30,69,70). For example, patients treated with *Ledum palustre* and *Vaccinium vitisidaea*, plants with antihistamine activity, have decreased exudate volume during acute inflammation as compared with untreated patients (15,60). A study in Russia involving over 1000 children with bronchial asthma demonstrated an aerosol inhalation of mixed herbs (species of *Ledum*, *Calendula*, *Urtica*, *Bidens*, *Plantago*, *Primula*, *Lemna*, *Populus*) with anti-inflammatory activity recovered more quickly than children not treated (68). A 14 month study on 70 patients with bronchial asthma demonstrated that those treated with medicinal plants had a three year remission rate of 90 percent as compared with a 27 percent remission rate in those treated with common steroid therapy (5). Anti-allergic activity has been demonstrated in *Scutellaria baicalensis* and *Rodiola rosea* (4,25,31,65,74,77).

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