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# Rare and Endangered Medicinal Plants of Georgia

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## ABSTRACT

*Medicinal species are in Georgia on different places. These species are on High Mountainat 2700 meters and some are at 20 meters above the Black Sea. Synonyms by some authors are in species and genes. Medicinal species are on month of the year and some species are in these periods: January – Galanthus L. (Amaryllidaceae); February - Viola L. (Violaceae); March – Gagea Salisb. (Liliaceae); April - Pulsatilla Hill (Ranunculaceae); May - Daphne L. (Thymelaeaceae); June – Rhododendron L. (Ericaceae); July – DigitalisL. (Scrophulariaceae); August – Scorzonera L. (Asteraceae); September: Colchicum L. (Liliaceae); October – Gentiana L. (Gentianaceae); November –Crocus L. (Iridaceae); December – Taxus L. (Taxaceae). All species has vitamins: A, B1, B2, B6, B9, B12, C, D, E, K, PP. Medicinal uses are antispasmodic; anodyne; antispasmodic; aphrodisiac; appetizer; cancer; cardiotonic; carminative; diaphoretic; emmenagogue; expectorant; homeopathy; narcotic; purgative;sedative; stimulant.We have checked information on general distribution of species and their rarity in other regions of Georgia, Caucasus or in the world in two herbaria. The general objective of the proposed project is to improve the livelihood and health of rural communities through the conservation, management, and sustainable use of medicinal and herbal plants for human and livestock needs in specific areas while ensuring effective protection of threatened species, habitats and ecosystems. Thisis determined bythelow lab our costs in opposite to alternative cultivation of medicinal plants, which needs highin home gardenstechnology and long time before plantings will bringincome to owners.The programmer is for conservation of medicinal plants.*

**Keywords:** *Flower, gene, mountain, plant, vitamin.*

## INTRODUCTION

Georgia has long traditions in folk medicine. Already is a reasonable estimate on this basis for the XVI/XV Interface, daughter of the King Ayet in Kolkhis, Medea has a garden of medicinal plants, where according to recent scientific investigations, 74 species have been cultivated. 70 of them are still used for folk medicine and 35 in modern scientific medicine. It should be noted that 55 of that species are mentioned in old Georgian medicinal books [1]. It is noteworthy, that in such ancient times there was a tradition to cultivate medicinal plants in gardens in Georgia, which is indicative of tolerance of Georgian people to nature [2, 3]. Unfortunately, nowadays, medicinal plants are collected mainly in the wild, which seriously threatens their populations, especially that of rare and vulnerable species.

Uncontrolled collection of medicinal plants in the wild seriously diminishes plant diversity and may cause species extinction. Industrial utilization of plants in big amounts in the wild is absolutely unacceptable, which, however, often undertaken private manufacturers. The primary causes of plant species endangerment are habitat degradation and loss, collection of medicinal, ornamental and other economically important plant species in undisturbed habitat, over grazing, deforestation, pollution, urbanization, road construction, etc. [4]. Therefore, the elaboration of mitigation and compensation measures is necessary to develop conservation needs of plant diversity by means of establishment protected areas and improvement of legislation basis. Moreover, effective solution of the problem of biodiversity loss might be encouragement of small holder farmers to cultivate economically valuable plants on their ground and supply the market. This will reduce uncontrolled utilization of this extremely vulnerable species in the wild and contribute to the conservation of biodiversity [5].

Local populations have to realize that overuse of biodiversity will cause severe impact on their livelihoods and they will be the first to suffer when these resources are degraded or lost. On the other hand, the biodiversity will offer great potential for marketing unique products, such as medicinal or ornamental plants, many of which are extremely valuable. Therefore, people have to cultivate these plants on their own grounds and not utilize them from their natural habitats. We have to remember that our actions not should deprive future generations the possibility to have the pleasure of seeing these remarkable life forms [6]. At the same time, sustainable use of these plants may improve social status of population and ensure realization of indigenous knowledge gained in our country from time immemorial.

The environmental objective is to improve conservation and sustainable use of medicinal and herbal plants of global importance at the national and the local levels for the selected areas through achieving the following objectives over and above the Baseline Scenario: (1) Assess existing environmental conditions in the region and determine main threats to the local flora; (2) Determine main gaps in existing knowledge on medicinal plant distribution and conditions of their populations; (3) Analyze regional baseline data and the identified short list of the rare plant species that have medicinal/decorative properties and are known to be threatened on a global level by anthropogenic stresses and/or impacted locally by natural hazards.

## METHODOLOGY

### Climate Change

Generally, Georgia is known for its favorable climate, with the Greater Caucasus Range serving as a barrier to the cold air from the north, producing a high thermal regime and a small number of extreme meteorological events. As a whole, the country can be divided into two distinctive climatic zones: humid subtropical in the west of the country, and dry subtropical in the east, naturally separated by the Surami range. The climate in Eastern Georgia is largely a product of the Surami Mountain Range, located in western Georgia, and the dry plains of Azerbaijan to the east. The predominantly West to East transfer of air masses over the region, along with or graphic lifting of the air associated with the mountain ranges, produce a damp climate in the western parts of Georgia, with almost uniform precipitation throughout the year. Consequently, the eastern side of the mountain ranges experience lower relative humidity, resulting in a dry-subtropical climate. The humid-subtropical mountainous climate with cold winter (<-5°C) and cool summer (<20°C), located in the Trialeti and Samsari Mountain ranges and Javakheti Plateau. The altitude, approximately 2.500 meters, largely explains the lower temperatures in this region [7].Mean annual precipitation in the transitional climate region is approximately 508 mm, and 654 mm at the Georgian-Turkish border. The majority of the precipitation falls between April and October, with May and June being considered the months with most rainfall (82 mm/month and 88 mm/month, accordingly). The driest months of the year in these parts are December (32 mm/month) and January (30 mm/month). Precipitation can usually be expected in the form of snow when ground temperatures are below 1-2°C, although this relationship is complicated by other meteorological influences Wind speeds are reported with an estimated annual average of 5.4 m/s, although still predominantly northerly and northwesterly [8]. However, speeds in excess of 12 m/s can occur for up to 50% of the year, with maximum wind speeds reaching as high as 30 m/s [9]. Available data suggests that average wind speed recorded near the Metering and Pressure Reduction Station (PRS) at the Georgia-Turkey border is 6.7m/s. The maximum wind speed recorded in this area over 20 years of observation was 57m/s.

## THREATS TO BIODIVERSITY

It is estimated that since historical times the world has lost c. 40% of its original 60 million $km^2$ of forest cover through human activity (FAO 1997). This loss continues today with c. 14.6 million hectares of forests destroyed each year, totaling a 4.2% loss of natural forest cover during the 1990s. It is no surprise therefore, that habitat destruction is a major threat to the world's biodiversity. For many species the habitat degradation that accompanies selective resource exploitation, or that occurs in habitats next to cleared areas, can have serious negative consequences too. Modeling studies show that the ranges occupied by many species will become unsuitable for them as the climate changes. The climate space that is suitable for particular species may shift in latitude or altitude, contract or even disappear. Many species will probably not be able to keep up with their changing climate space. As species move at different rates, the community structure

of ecosystems will also become disrupted. Both local and global extinctions are likely. One recent global study estimated that 15-37% of regionally endemic species could be committed to extinction by 2050, while another study in Queensland, northern Australia, shows that the number of extinctions will increase rapidly if temperatures rise by more than c. 2.C.

## INVENTORY OF MEDICINAL PLANT SPECIES

The short list composed mainly on the base of Red Data Book of Georgia needs to be revised using data, which will be collected during field trips. Quantitative evaluation will be used for determination of threat levels of separate plant species included in the short list. Desertification, Climate Change and Conservation of Wetlands. As well as lists of CITES (The Convention on International Trade in Endangered Species of the Wild Fauna and Flora) and, Environmental Lows of Georgia. Explanation of Brown Forest Soils. This soil type occurs mainly in the depression, at altitudes of 300-2200 m, on slopes of different aspect and gradient, alluvial fans and on sloping plains. Brown forest soils mainly develop on weathered crusts of sandstones and deluvial and proluvial sediments. Vegetation cover includes oak forests and oak forests with hornbeam. Mean annual precipitation varies within 500-800mm in the zone of forest brown soils. The water table is located at a significant depth below ground level and does not participate in soil-formation processes. Leached brown soils are found at the upper altitudes in the distribution zone for the soil type. Carbonate-brown soils occupy the lower zone where there are favorable conditions for calcium carbonate accumulation. The upper horizon is characterized by granular structure. Humus content varies from 3 to 5%. Brown soils are fertile.

## RESULTS

Local population have to realize that overuse of biodiversity will cause severe impact on their livelihoods and they will be the first to suffer when these resources are degraded or lost. On the other hand, the biodiversity will offer great potential for marketing unique products, such as medicinal or ornamental plants, many of which are extremely valuable. Therefore, people have to cultivate these plants on their own grounds and not utilize them from their natural habitats. Plants included in this calendar represent rare species collection of which in the wild is unacceptable. We have to remember that our actions not should deprive future generations the possibility to have the pleasure of seeing these remarkable life forms. At the same time, sustainable use of these plants may improve social status of population and ensure realization of indigenous knowledge gained in our country from time immemorial. The high-mountain profile of the area accounts for its near extreme climatic conditions. The estimated mean annual temperature for the area is 9.5°C, with an estimated average of -1.4°C in January and 19.5°C in July. Generally, the region experiences cold and occasionally snowy winters and long, but mild, summers. Precipitation increases westward with proximity to the Trialeti range. Flowers are in different of months of names in Georgia and flowers are in these months.

### January – Galanthus L. (Amaryllidaceae), Snowdrop

#### *Species Distributed*

Caucasian endemics are in Georgia: *Galanthus alpinus* Sosn.; *G. angustifolius* Koss; *G. lagodechianus* Kem.-Nath.; *G. krasnovii* A. Khokhr.;*G. platyphyllus* Traub & Moldenke; *G. krasnovii* A. Khokhr.; *G. platyphyllus* Traub & Moldenke; *G. rizehensis* Stern; and *G. woronowii* Losinsk. Endemic species are as synonyms: *G. caucasicus* (Baker) Grossh., *G. nivalis* subsp. *caucasicus* Baker etc., *G. schaoricus* Kem.-Nath.and these are in accepted name of *G. alpinus*Sosn.One synonym is *G. latifolius* Rupr. with accepted name of *G. platyphyllus*. All species chromosome numbers are for genes 2n=24. Others synonyms are endemics *G. kemulariae* Kuth. and *G. ketzkhovelii* Kem.-Nath. with accepted name of *G. lagodechianus*and genes are 2n=72.

#### *Cultivation Details*

Molecular plants are in alpine garden, Border, Container, Foundation, Massing, Rock garden, Woodland garden. Leaves and flowers appear in January almost simultaneously. The seeds ripen from May to June. Medicinal plant species are with flower in January and after in March. Seeds mature in June. This period in Georgia is from 3 species: *G. alpinus*,*G. caucasicus*, and*G. woronowii*.*G. alpinus* is this in a subalpine and alpine area above the mountains and flower planting occurs in the snow during the mountains and it is tall with late February until April. *G caucasica* and *G. woronowii* is in lowers of mountains and it has flowers in January. The dormant bulbs are fairly hardy and

will withstand soil temperatures down to at least 12°/-5°C. Other species are not in alpines and they has flowers from April and May and seeds mature in June: *G. angustifolius*; *G. lagodechianus*; *G. krasnovii*; *G. platyphyllus*; *G. krasnovii*; *G. platyphyllus*; *G. rizehensis*.Lycorin is used for bronchitis and other lung disease.Prefers a moist heavy soil is growing well in grass or amongst shrubs. Prefers a shady is position.

### *General Characteristics*

Bulb growing to 0.2 m by 0.08 m.*G. caucasicus*bulb is 1.5 cm in diameter and 1.5-2 cm broad. *G. alpinus*is in 6-8 cm long and 2 cm broad. *G. woronowii*is 20-25 cm long and 1.5 cm broad. These are molecular species and also contain polyphenols and turmeric for along with vitamin C, vitamin E, folic acid, vitamin B6, and vitamin B12. Contains alkaloids has tazettin, galanthamine and lycorin. Galanthamine is used in pharmaceutical industry for treatment of poliomyelitis and disease of the central nervous system.Other species has 20 cm long and 3 cm broad. These species are not for molecular. A very ornamental plant, it grows well on the woodland edge. The bulbs should be planted about 5-7cm deep as early in the spring as possible. A good bee plant is providing an early source of pollen and nectar. The plants take about 4 years to flower from seed.

## February - Viola L. (Violaceae), Violet

### *Species Distributed*

Caucasian endemics are in Georgia: *Viola caucasica* Kolenati; *V. ignobilis* Rupr.; *V. minuta* M. Bieb.; *V. somchetica* K.Koch; Georgian endemics are *V. orthoceras* Ledeb. and*V. vespertina* Klokov. The following species occur in Georgia:*Viola alba* Besser; *V. ambigua* Waldst. & Kit.; *V. arvensis* Murray; *V. canina* L.; *V. canina* subsp. *montana* (L.) Hartm.; *V. hirta* L.; *V. kitaibeliana* Schult.; *V. kupfferi* Klok.; *V. mandshurica* W. Beck.; *V. mirabilis* L.; *V. occulta* Lehm.; *V. odorata* L.; *V. oreades* M. Bieb.; *V. parvula* Tineo; *V. pumila* Chaix.; *V. pyrenaica* Ramond ex DC.; *V. reichenbachiana* Jord. ex Boreau; *V. rupestris* F. W. Schmidt;*V. sieheana* W. Beck.; *V. suavis* M. Bieb.; *V. tricolor* L.All species chromosome numbers are for many genes. Other species has many genes: *V. parvula* - 2n=10. *V. kitaibeliana* -2n=16; 18; 36; 40; 48.*V. alba*,*V. hirta*,*V. mirabilis*, *V. occulta*;*V. odorata*, *V. pyrenaica*,*V. reichenbachiana*, *V. rupestris*- 2n=20. *V. orthoceras* -2n=22. *V. tricolor* - 2n=26; 28; 42; 46. *V. arvensis* - 2n=34. *V. ambigua*,*V. canina*, *V. canina* subsp. *montana*, *V. pumila*, *V. reichenbachiana*, *V. suavis*- 2n=40. *V. mandshurica* -2n=24; 48. *V. sieheana* -2n=40; 60.

### *Cultivation Details*

Medicinal species are *V. alba*and *V. odorata*they have genes 2n=20 and other species *V. suavis* has 2n=40**.**These are in flower from February to April, and the seeds ripen from April to June. Succeeds in most soils but prefers a cool moist well-drained humus-rich soil in partial or dappled shade and protection from scorching winds. When grown in the open it prefers a moderately heavy rich soil. Plants have done very well in a hot dry sunny position on our Cornish trial grounds. Tolerates sandstone are limestone soils. Plants are hardy to about 15°/-8°C. The plants will often self-sow freely when well-sited. They can also spread fairly rapidly at the roots when they are growing well. Responds are well to an annual replanting in rich loose leafy soils. All members of this genus have more or less edible leaves and flower buds, though those species with yellow flowers can cause diarrhoea if eaten in large quantities.

### *General Characteristics*

Perennial are growing 1-15 cm high, up to 25 cm in fruit. Collected in the wild for medicinal purpose and for flower market are edible plants for vitamin C. The plant prefers light (sandy), medium (loamy) and heavy (clay) soils and requires well-drained soil. The plant prefers acid, neutral and basic (alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It requires moist soil. Contains alkaloid violin, vitamins and essential volatile oils. Used in folk medicine against cough, sore throat, bronchitis, skin disease and thrombosis. It is diuretic. Cultivation, it is desirable to substitute this species by Garden Violet, *V. odorata.*

## March – Gageasalisb.(Liliaceae)Yellow Star-of-Bethlehem

### *Species Distributed*

Caucasian endemic species is described for Georgia: *Gagea caroli-kochii* Grossh.; *G. chanae* Grossh.; *G. charadzeae* Davlian.; *G. commutata* K.Koch; *G. eleonorae* Levichev; *G. helenae* Grossh.; *G. sarmentosa* K.Koch; *G. sulfurea* Miscz.; The accepted species occur in Georgia: *G. alexeenkoana* Miscz.; *G. bulbifera* (Pall.) Salisb.; *G. chlorantha* (M. Bieb.) Schult. & Schult. fil.; *G. dubia* Terr.; *G. glacialis* K.

Koch; *G. germainae* Grossh.;*G. lutea* (L.) Ker-Gawl.;*G. pusilla* (F. W. Schmidt) Schult. & Schult. fil.; *G. taurica* Stev.; *G. villosa* (M. Bieb.) Duby; Synonym species are as accepted names in Georgia: *G. anisanthos* K.Koch is a synonym of *G. liotardii* (Sternb.) Schult. & Schult.f.; *G. tenuifolia* (Boiss.). Fomin is a synonym of *G. reticulata* (Pall.) Schult. & Schult.f.These species are chromosome numbers for many genes. Other species has many genes: *Gageaalexeenkoana*, *G. caroli-kochii*,*G. chlorantha*, *G. commutata*, *G. helenae*, *G. pusilla*, *G. reticulata*, *G. taurica*- 2n=24. *G. bulbifera* - 2n=24; 34. *G. germainae* - 2n=24; 48. *G. villosa* - 2n=24; 36; 48; 60; 72.*G. liotardii* - 2n=24; 48;72; 84. *G. anisanthos*, *G. chanae*, *G. charadzeae*, *G. dubia*, *G. glacialis*- 2n=48. *G. lutea* - 2n=48; 72; 96; 132.

### *Cultivation Details*

Medicinal species are *G. chanae* and *G. lutea*has grows on dry slopes with arid vegetation in flower from March to April. These species has genes 2n=48 in Georgia and not are more genes for *G. lutea*- 2n=48; 72; 96; 132. Suitable pH: 5.9 - 7.00acid, neutral and basic (alkaline) soils. It can grow in semi-shade (light woodland) or no shade. The dormant bulbs are fairly hardy and will withstand soil temperatures down to at least 18°/1°C. Sow the seed thinly so that there is no need to transplant them, and grow the seedlings on in the same pot in the greenhouse for their first year or two. Give an occasional liquid feed to ensure they do not become nutrient deficient. Pot up the small bulbs when the plants are dormant, placing 2 - 3 bulbs in each pot. Grow them on for another year or two in the greenhouse before planting them out when they are dormant.

### *General Characteristics*

*G. chanae* bulb medium size has rounded-ovoid and covered with dark tawny tunics with stem 5-15 cm long. *G. lutea*stem 10-30 cm long. Flower market is edible plants for vitamin B9 and vitamin K. Requires a moist soil is as preferring one on the alkaline side of neutral, and succeeding in sun or shade. Edible plant is in many countries. Leaves and roots are cooked. A famine food, it is only used in times of scarcity. Young leaves - cooked. Edible plant is in many countries. In folk medicine is used as diuretic. More widespread species are *G. anisanthos* and *G. alexeenkoana*. Perennial herbaceous plant with a small yellow flower and a small bulb. The fruit is glossy. It grows 8-15 cm high. Picking in autumn. They use water, jaundice and asthma treatment. The ball is used to lift the wounds.

## April - Pulsatillahill (Ranunculaceae) Lumbago

### *Species Distributed*

Caucasian endemic species is described for Georgia: *P. aurea* (Somm. & Levier) Juz.; *P. violacea* Rupr. Georgia endemic species is *P. georgica* Rupr. and it is a synonym of *P. violacea*; One is accepted names in Georgia: *P. albana* (Stev.) Bercht. & J. Presl. Chromosome numbers for many genes has these species: *P. albana*, *P. aurea*,*P. georgica*, *P. violacea*– 2n=16.

### *Cultivation Details*

Ornamental plant species are in flower from April to May, and the seeds ripen from May to June. It cannot grow in the shade. It requires dry or moist soil and can tolerate drought. The seed usually germinates in about 2-3 weeks. Sow stored seed in late winter in a cold frame. Germination takes about 1-6 months at 23°/5°C. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in the spring. Root cuttings, 4cm long taken in early winter, potted up in a mixture of peat and sand. They can also be taken in July/August, planted vertically in pots in a greenhouse or frame. Some care is needed since the plant resents root disturbance.

### *General Characteristics*

Medicinal plants have from flower market are edible for vitamin D and vitamin B12. Perennial is growing to 0.25 m. Pasqual flower is considered by herbalists to be of highly valuable modern curative use as herbal simple. The plant contains the glycoside ranunculi, this is converted to anemone when the plant is dried and is the medicinally active principle in the plant. The whole plant is alterative, antispasmodic, diaphoretic, and diuretic, expectorant, nerving and sedative. It is taken internally in the treatment of pre-menstrual syndrome, inflammations of the reproductive organs, tension headaches, neuralgia, insomnia, hyperactivity, bacterial skin infections, septicaemia, and spasmodic coughs in asthma, whooping cough and bronchitis. Externally, it is used to treat eye conditions such as diseases of the retina, senile cataract and glaucoma. This remedy should be used with caution; excessive doses cause diarrhoea and vomiting. It should

not be prescribed to patients with colds. See also the notes above on toxicity. The plant is harvested soon after flowering; it is more poisonous when fresh and so should be carefully preserved by drying. It should not be stored for longer than 12 months before being used.

## May - Daphne L. (Thymelaeaceae), Daphne

### *Species Distributed*

Caucasian endemic species is described for Georgia: *Daphne albowiana* Woronow ex Pobed. is a synonym of *D. pontica* subsp. *haematocarpa* Woronow; *D. axilliflora* (Keissl.) Pobed.; *D. caucasica* Pall.; *D. glomerata* Lam.; *D. pseudosericea* Pobed. is a synonym of *D. sericea* subsp. *pseudosericea* (Pobed.) Halda. Three more species are in Georgia: *D. mezereum* L.; *D. pontica* L. and *D. transcaucasica* Pobed. is a synonym of *D. oleoides* subsp. *transcaucasica* (Pobed.) Halda. All species has many genes of chromosome numbers - 2n=18.

### *Cultivation Details*

It is in flower from May to June, and the seeds ripen from July to August. Germination should normally take place by spring, though it sometimes takes a further year. Stored seed is more problematic. It should be warm stratified for 8-12 weeks at 27°/10°C followed by 12-14 weeks at 3°C. Germination may still take another 12 months or more at 15°C. Prick out the seedlings into individual pots as soon as they are large enough to handle. Grow the plants on in the greenhouse for their first winter and then plant out in spring after the last expected frosts. Tincture of the bark is used in folk medicine as pain reliever and reducing fever, as well for wound healing into your diet. Berries cause diarrhoea. Effective against the leukaemia cells rather than normal blood cells.

### *General Characteristics*

An evergreen shrub growing to 3-15cm at a medium rate. Daphne species has vitamins C and E. A good sandy loam suits most members of this genus. Prefers is as good heavy soil and some shade. Prefers is as calcareous soil and cool moist conditions. There is no evidence to suggest it requires a calcareous soil, but all members of this genus do well on acid soils. Plants tend to be short-lived in cultivation, probably due to excessive seed bearing. Plants are resentful of root disturbance and should be planted into their permanent positions as soon as possible. They also resent being cut and so should not be pruned unless it is essential. The flowers have a delicious sweet perfume. The seeds own in a greenhouse as soon as it is ripe with the pot sealed in a polythene bag to hold in the moisture.

## June – Rhododendron L. (Ericaceae) Target Species

### *Species Distributed*

Caucasian endemic species is described for Georgia: *Rhododendron caucasicum* Pall.; *Rh. smirnowii* Trautv.; *Rh. ungernii* Trautv.; Three species are in Georgia: *Rh. luteum* Sweet; *Rh. ponticum* L. and Rh. x sochadzeae Charadze & Davlianidze.These 6 species have many genes of chromosome numbers - 2n=26.

### *Cultivation Details*

It is in leaf all year, in flower from June to July. It grows only on northern shaded slopes in and above tree line eco tone. The temperature is 30°/15°C in June. A pH between 4.5 and 5.5 is ideal. Plants in this genus are notably susceptible to honey fungus. Succeeds in sun or shade, the warmer the climate the more shade a plant requires. It does not compete well with surface-rooting trees. Best sown in a greenhouse as soon as it is ripe in the autumn and given artificial light. Alternatively sow the seed in a lightly shaded part of the warm greenhouse in late winter or in a cold greenhouse in April.

### *General Characteristics*

An evergreen Shrub growing to 1.5 m. Medicinal species has cardiac and Vitamins (C, B1, B2, PP). Tea made from the plant is used to treat heart and circulation malfunctions, but it should not be used without expert supervision because of toxicity of the plant. The flowers are analgesic, anesthesia and sedative. They are applied externally in the treatment of arthritis, caries, itch, maggots and traumatic injuries. Surface-sow the seed and do not allow the compost to become dry. Pot up the seedlings when they are large enough to handle and grow on in a greenhouse for at least the first winter. Layering should be done in late July. It takes 15-24 months. Cuttings of half-ripe wood planted in August in a frame are difficult to cultivate.

## July – Digitalisl. (Scrophulariaceae)

### *Species Distributed*

Caucasian endemic species is described for Georgia: *Digitalis ciliata* Trautv.; D. *schischkinii* Ivanina is a synonym of *Digitalis*

*ferruginea* subsp. *schischkinii* (K.V.Ivanova) K.Werner. Two species are in Georgia: *D. ferruginea* L. and *D. nervosa* Steud. & Hochst. ex Benth. *Digitalis*4 species have the sechromo some numbers of genes - 2n=56. Only one species of *D. ferruginea* has two numbers of genes - 2n=56; 70.

### *Cultivation Details*

*D. ferruginea* is grown in forest openings, under trees in forest edges. It is in flower in July, and the seeds ripen in September. Plants are hardy to about 37°/21°C. The seed usually germinates in 2-4 weeks at 20°C. An easily grown plant is succeeding in ordinary garden soil. Especially of *D. ferruginea* is it rich as inorganic matter. It also succeeds in dry soils and, once established, is drought tolerant. It prefers semi-shade but succeeds in full sun if the soil is moist. This species is a short-lived perennial and is best grown as a biennial. Members of this genus are rarely if ever troubled by browsing deer and rabbits.

### *General Characteristics*

*D. ferruginea* is growing to 40-70(120) cm. Rosette and radical leaves has 7-15(40) cm long. Raceme is 15-25(40) cm long, cylindrical, pointed above, sparsely flowered at base and in middle. They are often used in the treatment of certain heart complaints. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Another report says that the seed is best sown in the autumn. Grazing, habitat degradation, collected in the wild for medicinal purpose.

## August – Scorzonera L. (Asteraceae), Djavakhetian Viper's Grass

### *Species Distributed*

Caucasian endemic species is described for Georgia: *S. biebersteinii* Lipsch.; *S. charadzeae* Papava; *S. czerepanovii* Kuth. (=synonym *S. lanata* (L.) Hoffm.); *S. dzhawakhetica* Sosn. ex Grossh. (=synonym *S. sosnowskyi* Lipsch.); *S. seidlitzii* Boiss.; Georgia endemic species are *S. ketzkhowelii* Sosn. ex Grossh.; *S. kozlowskyi* Sosn. ex Grossh. (=synonym *S. debilis* Sosn.); One species of *Scorzonera* distributed are not accepted name: *S. taurica* M. Bieb. is a synonym of *S. hispanica* subsp. *asphodeloides* (Wallr.) Arcang.All species of chromosome numbers are for many genes – 2n=12; 14.

### *Cultivation Details*

*S. dzhawakhetica*is in flower from August to September, and the seeds ripen in September-October. Other species: *S. charadzeaeS. seidlitzii, S. ketzkhowelii, S. kozlowskyi*are in flower from July and August.Plants are hardy to about 38°/20°C. Prick out the seedlings as soon as they are large enough to handle into relatively deep pots to accommodate the tap root. If growth is good, plant out in early summer, other is wise grow them on in the greenhouse for their first winter and plant them out in late spring of the following year. Division in autumn or as growth commences in the spring. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer. Root cuttings in the autumn.

### *General Characteristics*

Stems 7.5-10(25) cm high, numerous, slender, virgate, branched, leafy. Species of this genus are edible plant, rich in vitamins and nitrogenous substances, rubber-bearing plant. All species has vitamins: A, C, E. Coffee like beverage is prepared from the roots. The root is rich in inulin. This is a starch that is not easily digested by humans and so generally passes straight through the digestive system and is excreted. Flower buds might be eaten raw. Succeeds is in any soil in sun or light shade. Plants are required calcareous soils. Plants usually regenerate from the root after they have been cut.

## September: Colchicum L. (Liliaceae), Naked Ladies

### *Species Distributed*

Georgia endemic species is *Colchicum woronowii* Bokeriya. Three species are distributed in Georgia are found –*C.speciosum* Steven; *C. szovitsii* Fisch. &C.A. Mey., *C. umbrosum* Steven, is flowering in the spring; *C. umbrosum* and *C. speciosum* are flowering in autumn. These species of chromosome numbers are different genes: *C. umbrosum*– 2n=24. *C. speciosum* – 2n=38, 40, 42, 54. *C. szovitsii* – 2n=18; 54. *C. woronowii* – 2n=42; 48.

### *Cultivation Details*

*C. speciosum* is in flower from September to October. It is grown in subalpine meadows on sunny sites. Fruit and leaves appear next year in March and seed dispersal takes place in June-

July. Prefers is rich well-drained loam in a sunny position. Tolerates partial shade but dislikes dry soils. Tolerates is pH in the range 4.5 to 7.5. Plants are hardy to about 34°/18°C. The dormant bulbs are fairly hardy and will withstand soil temperatures down to at least -5°C.Germination can be very slow, taking up to 18 months at 15°C.Larger bulbs can be planted out direct into their permanent positions, though it is best to pot up the smaller bulbs and grow them on in a cold frame for a year before planting them out. The plant can be divided every other year if a quick increase is required.

### *General Characteristics*

The Naked Ladies is easily grown in grass and can be naturalized there. It also grows well amongst shrubs and by woodland edges. Plant the corms about 7-10 cm deep in July. The flowers are very attractive to bees and butterflies. It is best to sow the seed thinly so that it is not necessary to transplant the seedlings for their first year of growth. All species has vitamins: C, D, E. Apply a liquid fertilizer during their first summer, however, to ensure they get sufficient nourishment. Prick out the seedlings once they are dormant, putting perhaps 2 plants per pot, and grow them on in a greenhouse or frame for at least a couple of years. Plant them out into their permanent positions when they are dormant. The seedlings take 4-5 years to reach flowering size. Habitat degradation, collected in the wild for medicinal purpose and for flower market.

## October – Gentiana L. (Gentianaceae), Gentian

### *Species Distributed*

Caucasian endemic species is described for Georgia: *Gentiana angulosa* M. Bieb. is a synonym of *G. verna* subsp. *pontica* (Soltok.) Hayek; *G. lagodechiana* (Kusn.) Grossh. is a synonym of *G. septemfida* Pall.; *G. oschtenica* Woronow; *G. paradoxa* Albov; Georgia endemic species is *G. kolakovskyi* Doluch. and it is a synonym of *G. septemfida* subsp. *kolakovskyi* (Doluch.) Halda; *G. rhodocalyx* Kolak.; The following species occur in the Caucasus: *G. aquatica* L.; *G. cruciata* L.; *G. gelida* M. Bieb.; *G. nivalis* L.; *G. schistocalyx* K. Koch is a synonym of *G. asclepiadea* L.; *G. pneumonanthe* L.; *G. prostrata* Haenke; *G. pyrenaica* L. However, we did not find these populations. These species of chromosome numbers has different genes: *G. nivalis*– 2n=14. *G. gelida,G. pneumonanthe*, *G. pyrenaica*, *G. septemfida* subsp. *kolakovskyi* (=*G. kolakovskyi*); *G. septemfida*- 2n=26. *G. verna* subsp. *pontica* (=*G. angulosa*)- 2n=30. *G. asclepiadea* -2n=32; 36; 44. *G. prostrata*- 2n=36; *G. aquatica* – 2n=48. *G. cruciata* - 2n=52.

### *Cultivation Details*

*G. gelida,G. pneumonanthe* and *G. septemfida* are in flower from July to October. Seeds are in October for foods. Used is in folk medicine for treatment of uterine fibroids. It is antiseptic and regulates digestive system. Grows is subalpine and alpine meadows. In general, gentians require a moist well-drained soil in a sheltered position, a certain minimum of atmospheric humidity, high light intensity but a site where temperatures are not too high. They are therefore more difficult to grow in areas with hot summers and in such a region they appreciate some protection from the strongest sunlight. Plants are hardy to at least 25°/9°C. A moisture loving plant, preferring to grow with full exposure to the sun but with plenty of underground moisture in the summer, it grows better in the north and west of Britain. Plants are intolerant of root disturbance. It is advantageous to keep the seed at about 10°C for a few days after sowing, to enable the seed to imbibe moisture. Following this with a period of at least 5-6 weeks with temperatures falling to between 0 and -5°C will usually produce reasonable germination. Local population collects in big amount for traditional use in folk medicine.

### *General Characteristics*

Perennial growing to 4 cm. Seed - best sown as soon as it is ripe in a light position in a cold frame. It can also be sown in late winter or early spring but the seed germinates best if given a period of cold stratification and quickly loses viability when stored, with older seed germinating slowly and erratically. It is best to use clay pots, since plastic ones do not drain so freely and the moister conditions encourage the growth of moss, which will prevent germination of the seed. The seed should be surface-sown, or only covered with a very light dressing of compost. The seed requires dark for germination, so the pots should be covered with something like newspaper or be kept in the dark. Pot up the seedlings into individual pots as soon as they are large enough to handle and grow on in light shade in the greenhouse for at least their first winter. The seedlings grow on very slowly, taking 2-7 years to reach flowering size. When the plants are of sufficient size, place them out into their permanent positions in late spring or early summer.

## November – Crocus L. (Iridaceae)

### *Species Distributed*

Caucasian endemic species are in Georgia: *C. kotschyanus* K.Koch,*C. scharojanii* Rupr., *C. suworowianus* K.Koch, *C. vallicola* Herb. Georgia endemic species is *C. autranii* Albov. Three synonym species are in Georgia: *C. adamii* J.Gay is a synonym of *C. biflorus* subsp. *adamii* (J.Gay) K.Richt., *C. artvinensis* (J.Philippow) Grossh. is a synonym of C. *biflorus* subsp. *artvinensis* (J.Philippow) B.Mathew, accepted is *C. speciosus* M. Bieb. These species of chromosome numbers has different genes: *C. speciosus* – 2n=6; 8; 10; 12; 14; 18. *C. scharojanii, C. vallicola*- 2n=8. *C. kotschyanus* - 2n=8; 10; 20. *C. biflorus* subsp. *adamii* - 2n= 12. *C. suworowianus* - 2n=20. *C. autranii*- 2n=32.

### *Cultivation Details*

*C. sativus* is cultivated plant. The wild species are growing of meadows in steepor gentle slopes covered with grasses. It is in leaf from October to May. It is in flower in November. However, we were not able to reach this population and monitor it. For cultivation it is desirable to use cultivated species of this genus *C. sativus* which is a valuable market species and easy to cultivate. However, if seed is obtained then it is best sown as soon as it is ripe in a cold frame. Stored seed can bestow in the spring in a cold frame. Germination can take 1-6 months at 20°/-1°C. The plant prefers light (sandy) and medium (loamy) soils, requires well-drained soil and can grow innutritionally poor soil. The plant prefers acid, neutral and basic (alkaline) soils and can grow in very alkaline soil. It can grow in semi-shade (light woodland) or no shade. It requires dry or moist soil.

### *General Characteristics*

Corm growing corm flat-based to 2-3 cm in diameter. Divide the small bulbs once the plants have died down, planting 2-3 bulbs per 8cm pot. Medicinal uses are abortifacient; anodyne; antispasmodic; aphrodisiac; appetizer; carminative; diaphoretic; emmenagogue; expectorant; narcotic; sedative; stimulant. This remedy should be used with caution, large doses can be narcotic and quantities of 10g or more can cause an abortion. Saffron is a famous medicinal herb with a long history of effective use, though it is little used at present because cheaper and more effective herbs are available. The flower styles and stigmas are the parts used, but since these are very small and fiddly to harvest they are very expensive and consequently often adulterated by lesser products. The styles and stigmas are anodyne, antispasmodic, aphrodisiac, appetizer, carminative, diaphoretic, emmenagogue, expectorant, sedative and stimulant.

## December – Taxus L. (Taxaceae), Common Yew

### *Species Distributed*

*Taxus baccata* L. is growing in Georgia. Chromosome numbers of genes: 2n=24. Green mass is collected in big amounts in different regions of Georgia for drug industry, which threatens species survival. Branches are collected for flower market for decorative purposes.

### *Cultivation Details*

Flower is not for medicinal and seeds are to feed. It is in leaf all year, in pollination from March to April, and the seeds ripen from October to December. A very easy plant to grow, it is extremely tolerant of cold and heat, sunny and shady positions, wet and dry soils, exposure and any pH: 6-7.05 acid, neutral and basic (alkaline) soils.In general they are very tolerant of exposure, though plants are damaged by severe maritime exposure. A very cold hardy is for plant when dormant, tolerating temperatures down to about 12°/-3°C. The fresh young shoots in spring, however, can be damaged by frosts. Plants are dioecious, though they sometimes change sex and monoecious trees are sometimes found. Male and female trees must be grown if fruit andseed is required. The fruit is produced mainly on the undersides of one-year old branches. Very old trees are kept in nature preserve Batsara located in Pankisi gorge in Eastern Georgia.

### *General Characteristics*

An evergreen gymnospermous tree growing to 15m by 10m at a slow rate. The seed has fleshy aril about 10mm in diameter. Very sweet and gelatinous, most people find it delicious though some find it sickly. Medicinal uses are antispasmodic; cancer; cardiotonic; diaphoretic; emmenagogue; expectorant; homeopathy; narcotic; purgative. The yew tree is a highly toxic plant that has occasionally been used medicinally, mainly in the treatment of chest complaints. Modern research has shown that the plants contain the substance 'taxol' in their shoots.The species is dioeciously (individual sporophylls are either male or female, but only one sex is to be found on any one plant so both male and

female plants must be grown if seed is required) and are pollinated by wind. Young plants occasionally grow 30cm in a year but this soon tails off and virtually no height increase is made after 100 years.

## CONCLUSION

The industrial use of medicinal plants is many. It involves the production of traditional herbal medicinal, herbal teas, health foods and modern drugs. The United Nations Industrial Development Organization (UNID) recently published a list of 70 medicinal plants used in modern drug industry. Nowadays, there are at least 120 distinct chemical substances derived from plants that are considered as important drugs currently in use in one or more countries in the world. Many European countries regulate herbal products as drugs and pharmaceutical companies prepare plant based drugs simply by extracting out the active chemicals from the plants. Although, several drugs are synthetic modifications of the naturally obtained sub stances.

Georgia has big potential to develop industry of drugs derived from plants. Pharmaceutical industry was developed here since soviet times. However, to enter world market with modern health care products requires well developed extraction techniques, which are widely known in Western nations. Therefore, there is urgent need in collaboration, technical assistance and in conducting research on plant-based products to develop modern pharmaceutical industry in the country. So far, developing countries are considered as deliverers of rough herbal materials to western countries producing drugs. Today, Bulgaria, Germany and Poland are recognized as major exporters of plant-based medicinal products. The problem is that harvesting of medicinal plants in developing countries mainly occurs in the wild often on a scale detrimental to the viability of populations. This is determined by the low lab our costs in opposite to alternative cultivation of medicinal plants in home gardens, which needs high technology and long time before plantings will bring income to owners. Therefore, it will be very difficult to achieve complete forbidden on harvesting plants in the wild. This makes important preserving species in their natural habitats.

## REFERENCES

[1] A.A. Grossheim.1939. Flora of Caucasus: Polypodiaceae - Gramineae. V.1. - Baku, Publishing house AzFaN, pp. 368-363. (In Russian).

[2] A. Dolukhanov.1989. Rastitel'nost' Gruzii. (Vegetation of Georgia). v.1. Metsniereba, Tbilisi,

[3] M. Akhalkatsi.2015. Erosion and Prevention of Crop Genetic Diversity Landraces of Georgia (South Caucasus). In: M.R. Ahuja & S. Mohan Jain (Eds.), Genetic Diversity and Erosion in Plants. Springer International Publishing,7: 159-187.

[4] A. Makashvili, D. Sosnowsky.1941. Sakartvelos flora (Flora Georgian). Georgia, Tbilisi (In Georgian).

[5] M. Akhalkatsi.2009. Conservation and sustainable use of crop wild relatives in Samtskhe-Javakheti. Tbilisi.

[6] M. Akhalkatsi, G. Gvaladze, T. Girgvliani. 2016. Situational Analyses of the Current State of Plant Genetic Resources Important for Food and Agriculture in Georgia (Caucasus Ecoregion). Agricultural Research & Technology: Open Access Journal 2 (2): 1-5.

[7] T. Goloshvili, M. Akhalkatsi, G. Badridze. 2018. Characterization of grape seed extracts of native to Georgia varieties of Vitis vinifera L. Pak. J. Bot., 50(1): 245-250.

[8] M. Akhalkatsi, M. Pfauth, C. Calvin.1999. Structural aspects of seed and ovule development and non-random abortion in Melilotus officinalis (Fabaceae). Protoplasma, 18 208: 211-223.

[9] M. Akhalkatsi, D. Tarkhnishvili. 2012.Habitats of Georgia, GTZ, Tbilisi.

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