

Medicinal Plants from Central and Western Asia

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GENERAL BACKGROUND

The former Soviet Union covers 1/6 of the earth's landmass and encompasses an extremely broad range of plant diversity. A large number of plant species including medicinal plants originated in this region. The germplasm from this area could be of value to ongoing breeding programs to provide new medicinal crops and/or new compounds for the pharmaceutical industry and the botanical/dietary supplemental industry in the US and Europe. The Russian scientist, Nikolai Vavilov, and thousands of his colleagues collected germplasm from all over the world. The most extensive plant collections in the world are located at the Vavilov Institute in St. Petersburg, Russia and at the branch of the Vavilov's Institute in Tashkent, Uzbekistan. As part of a collaborative project between Rutgers University and Uzbekistan and Kyrgyzstan, several medicinal plants were collected from these two independent nations of Central Asia and brought in the US for evaluation.

OBJECTIVES

In Spring 2001, a subset of this species collection was planted at the field of Snyder Research and Extension Farm Rutgers University, New Jersey. The objectives of this research were to evaluate each species for their potential under New Jersey

conditions: to generate basic information on the plants growth, yield and natural products content; and to establish the plant collection for educational purposes and for serving as a source for new introduction to other states in the USA especially in the northern states.

The plants description and medicinal uses are shown below.

1) *Ephedra equisetina* (Fam. Ephedraceae) is a perennial shrub with a strong root system, stem reaching up to 1.5 m in height, dioecious. Mass of 1000 seeds is 6.5–9 g. Area of distribution is mountainous areas of Kazakhstan and Central Asia. For medical applications, the young green shoots are utilized. The alkaloid ephedrine is extracted from *Ephedra*. Shoots also contain up to 11% tannin. In Central and Western Asia ephedrine is used as a medical treatment for asthma, raising blood pressure, nasal congestion, sea sickness, antidotes to poisons, and for spinal and cerebral anesthesiology.

2) *Ammi majus* – (Fam. Umbelliferae) annual, up to 1–1.4 m high, fruits small (2–3, x 1 mm). Fruits contain up to 0.5% furo-coumarin. Area of distribution is Mediterranean region, North Africa, and North Caucasus. In medicine fruits are utilized. Furo-coumarin is used as a medical treatment for skin diseases.

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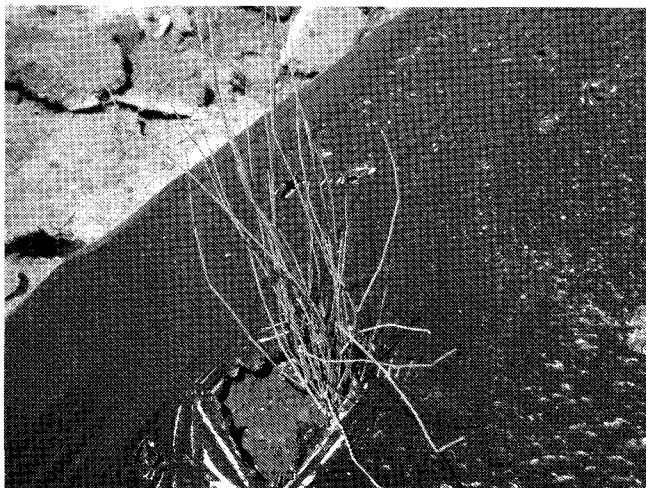


Photo 1. A photo of a young plant of *Ephedra equisetina* grown in northern New Jersey, 2001.

3) *Salvia officinalis* (Fam. Labiatae) perennial semi-shrub, up to 50 cm high. Area of distribution is Mediterranean region. In medicine leaves are utilized by extracting essential oils and tannins. Which are used for antiseptically treatment.

4) *Scutellaria baicalensis* (Fam. Labiatae) is a perennial plant that reaches up to 15–35 cm high while its root grows up to 50 cm deep. It is propagated by seeds. Area of distribution includes the Baikal Lake area (Russia), North-East Mongolia, and North-East of China. In traditional medicine, it is the



Photo 2. A photo of a young plant of *Scutellaria baicalensis* grown in northern New Jersey, 2001

roots, which contain high concentrations of flavonoids, are utilized. As a medicinal, it is used to stabilize blood pressure and as a sedative. The plant is typically used in herbal combinations for the treatment of inflammatory skin conditions, allergies, high cholesterol and high blood pressure.

5) *Potentilla erecta* (Fam. Rosaceae) is a perennial, grows up to 15–50 cm high with roots that reaches 2–7 cm length and in 1–3 cm in diameter. *P. erecta* plants found growing in acid and wet soils. Its area of distribution includes Europe, Caucasus, and West Siberia. As a traditional medicinal plant, it is the roots that are utilized. Roots contain up to 14% tannins and essential oils (tormentol). The roots are traditionally used in the treatment of inflammation of the mouth, internal bleeding and appears to have a variety of veterinary applications in the treatment of animal health.

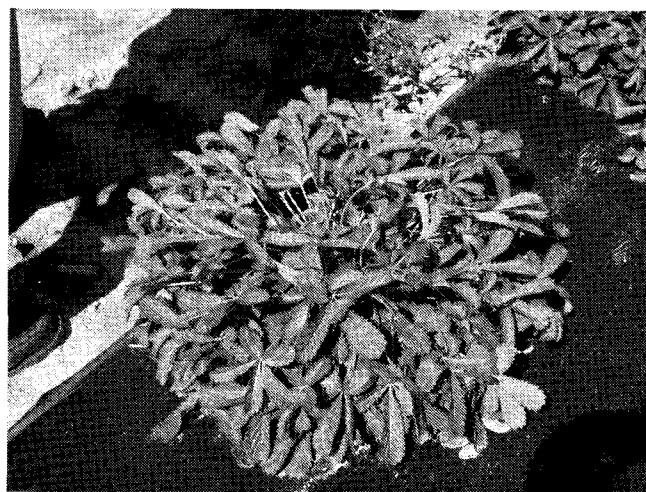


Photo 3. A photo of a young plant of *Potentilla erecta* grown in northern New Jersey, 2001

6) *Valeriana officinalis* (Fam. Valerianaceae) perennial, up to 50–135 cm high with diameter 3.5–7 mm. Roots up to 1.5–3 cm. Prefers wet soil. Area of distribution is Europe and temperate zones of Asia. In medicine roots are utilized. Root extract contain up to 0.5–2% essential oils and tannin. In medicine roots are used for as an anti-spasmodic and sedative, for centuries it has been used to treat restlessness and nervous disturbances in sleep.



Photo 4. A photo of a young plant of *Valeriana officinalis* grown in northern New Jersey, 2001

7) *Sanguisorba officinalis* L. (Fam. Rosaceae) is a perennial plant that has thin and deep roots and grows up to 100 cm high. This plant is found in moist meadows and shady places, chiefly in mountainous districts, almost over most Europe and partly in Central Asia. Both the foliage and the roots are used in traditional medicine. The herb is gathered in July, while the root is harvested in autumn. It is astringent and tonic. In traditional Asian medicine, leaves and roots are administered internally in all abnormal discharges: in diarrhoea, dysentery and leucorrhoea. It has been also used to stop purgings.

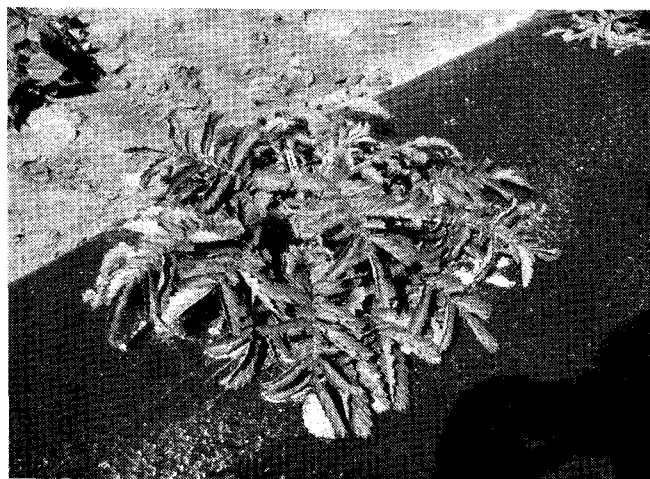


Photo 5. A photo of a young plant of *Sanguisorba officinalis* grown in northern New Jersey, 2001.

The entire plant exhibit astringent qualities, but the root possesses the greatest astringency. A decoction of the whole herb has been found useful in stopping hemorrhages and is prepared to act as an energy booster.

8) *Bidens tripartita* (Fam. Asteraceae) annual, up to 15-60 (100) cm high, small tap root. Flowering from June till September. Area of distribution is Europe, Caucasus, Central Asia (except Turkmenistan), Siberia, Far East. Prefers wet soil. In medicine leaves and shoots are utilized. The leaves and shoots contents up to 10 flavonoids, cumarins, ascorbic acid, and low content essential oils. This plant was formerly valued for its diuretic and astringent properties, and was employed in fevers, for stone bladder and kidney stones, and was considered also a good stypic and an excellent remedy for ruptured blood-vessels and bleeding of every description, and of benefit to with tuberculosis patients.

9) *Zizyphus jujuba* (Fam. Rhamnaceae) perennial shrub (up to 3m) or tree (up to 10 m high). Area of distribution is Central Asia, Caucasus, Japan, Korea, Mongolia, and North-Central China. Prefers dry hilly soil. There are both cultivated and wild forms of the plant. In medicine fruit are widely used as well as leaves. The fruits contain up to 42% sugar, 3.4% organic acids, small amount of tannins and essential oils, as well as kumarins, flavonoids, vitamin C. In medicine it is used for stabilization of blood pressure, tonic, stomach infections, and diarrhea. A 10% leaf infusion is used for inducing micturation and stabilizing blood pressure.

10) *Salvia sclarea* (Fam. Labiatae) perennial grass type plant, up to 40-120 cm high, top root. Area of distribution is Central Asia, Caucasus, Iran, and Mediterranean region. Flowering is in June-July, depending of elevation. Inflorescences are pink-blue. In medicine inflorescences and shoots are utilized. Both parts contain essential oils up to 0.53%, but inflorescences have twice as much. In medicine it is used as a treatment for nervous system, arthritis, broken bones.



Photo 6. A photo of a young plant of *Salvia sclarea* grown in northern New Jersey, 2001

11) *Inula helenium* (Fam. Asteraceae) perennial grass type plant, up to 1-1.5 high. Area of distribution - widely spread in Central Asia, Caucasus, Europe, North America. It prefers wet soil. The plant has a large, long, branching, yellow root. The root is preferably collected in the fall of the second year and thoroughly freed from dirt, sliced crosswise or lengthwise and carefully dried in the shade. The roots contain 1-3% essential oils, saponin and inulin. In medicine it is used for expectoration, antiseptic, helps with stomach ulcers, and induces strengthening of capillaries.

12) *Silybum marianum* (Fam. Asteraceae) annual-biennial, up to 60-150 cm high. Area of distribution is Central Asia, Caucasus, North Africa, South Australia, West Europe, and North America. It prefers dry soil. Fruits contain up to 32% fat oil and 0.1% essential oils. It is used medicinally for functional disorders of the liver and gallbladder. Also used for cases of jaundice, colitis, pleurisy, and diseases of the spleen. It is a low toxicity herb.

13) *Foeniculum vulgare* (Fam. Umbelliferae) perennial grass type plant, up to 1 m high. Area of distribution is Central Asia and Southwestern Europe. The plants tolerates dry, sandy, acidic soils. Because it reproduces both by seed and from the crown or root system, it is very successful at spreading. Fruits

contain up to 18% fat oil and 4-6% essential oils. Fennel is traditionally used for stomach and flatulence. It is known for its cleansing, diuretic properties and like fennel tea made from the seeds, it is often used for inducing weight loss and dispelling water retention.

14) *Pastinaca sativa* (Fam. Apiaceae) is a biennial with a tough, wiry taproot root. The plant can reach 30-200 cm high. Area of distribution in Asia includes Caucasus and West Siberia. Roots are edible. In traditional medicine fruits, shoots, and roots are utilized. Fresh fruits contain 0.4-0.6% essential oils, shoots contain 0.36%, and roots 1.35%. In medicine the plant is traditionally used for coronary diseases, digestive system, and kidney diseases.

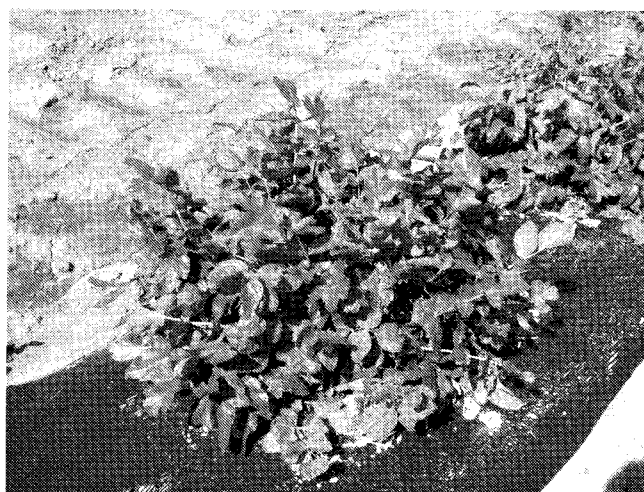


Photo 7. A photo of a young plant of *Pastinaca sativa* grown in northern New Jersey, 2001.

15) *Lavandula vera* (Fam. Labiatae) perennial semi-shrub, up to 60-75 cm high. Area of distribution is North Caucasus, Krimea, Moldavia, and Mediterranean region. It prefers dry hilly soil. In medicine, inflorescences and shoots are utilized. The inflorescences and shoots contain essential oils. In medicine it is used for sedation in nervous disorders, paralysis, and as an external medication for injuries.

16) *Chelidonium majus* (Fam. Papaveraceae) is a perennial that grows up to 1 m. Area of distribution in Asia includes temperate and sub-arctic Eurasia, Central Asia, Caucasus, and Siberia. This species is

found in rubble, damp ground, banks, hedgerows and by walls. The plant is rich in alkaloids and over 10 alkaloids are present in shoots. In traditional medicine it is used in the treatment of liver and gallbladder diseases.



Photo 8. A photo of a young plant of *Chelidonium majus* grown in northern New Jersey, 2001.

17) *Calendula officinalis* (Fam. Asteraceae) annual grass type plant, up to 30–50 cm high. The plant is a native of Southern and Central Europe. In medicine inflorescences are utilized. The inflorescences contain caratinoides, flavanoids, organic acids, alkaloids, and essential oils. Calendula heals wounds as well as internal and external ulcers. It is an antiseptic, improves blood flow to affected areas, as well as stomach and gallbladder diseases.

18) *Bryonia alba* (Fam. Cucurbitaceae) perennial grass type plant. It has creeping shoots, up to 3.5 m length. Area of distribution is Central Europe, Caucasus, and Scandinavia. In medicine, roots are utilized. In medicine it is used for bleeding staunching, rheumatism, alleviation of aches, increasing of menstrual flow, pleurisy, a constipation, and skin problems of the scalp.

19) *Ricinus communis* (Fam. Euphorbiaceae) perennial in tropical Africa which reaches up to 10 m. It is annual in an temperate and continental climates with plant 1–3m in high. Tap root, leaves up to 80

cm in diameter. Area of distribution is temperate Eurasia, including Central Asia, Caucasus, and North America. The plant is becoming a common weed in the Southwest U.S. In medicine seeds are utilized. In medicine, it is used for constipation, moisturizer of the skin, hair induction, and strengthening hair follicles, as well as for gynecological disorders.

20) *Linum usitatissimum* (Fam. Linaceae) annual grass type plant, up to 30–120 cm high, with a tap root. Prefers heavy acid soil. Areas of distribution include Eurasia, including Central Asia, Caucasus, and North and South America. In medicine seeds are utilized. In medicine, it is used for gastric, colitis, ulcers of stomach, cystitis, constipation, arteriosclerosis, skin burns, and exema diseases.

21) *Angelica sinensis* (Fam. Apiaceae) is known by its ethnic names Dong Quai, Dang Gui and Tang - kuei. It grows profusely throughout Asia. Called the “female ginseng” dong quai is an all-purpose herb for a wide range of female gynecological complaints. Dong Quai is a Chinese Herb that is utilized when a patient has been diagnosed with blood deficiency or blood deficiency with chronic wind-damp painful obstruction. It is believed to work by strengthening, stimulating and harmonizing the blood. Some symptoms that can be associated with blood deficiency

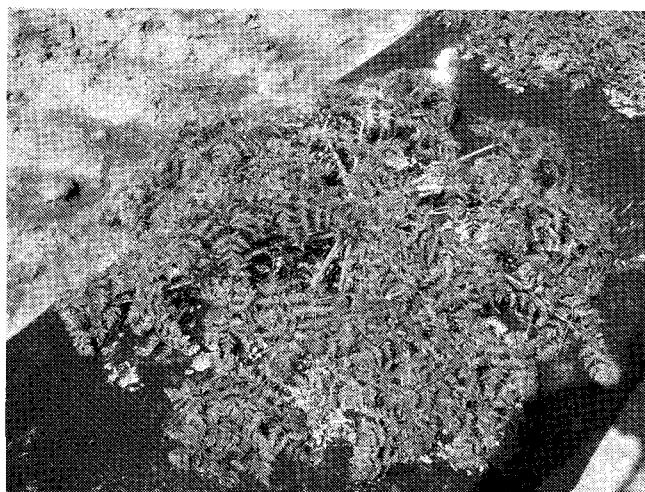


Photo 9. A photo of a young plant of *Angelica sinensis* grown in northern New Jersey, 2001.

are: menstrual disorders, abdominal pain or discomfort, pallid skin, tinnitus, blurred vision, and palpitations. Dong Quai contains many bioactive natural products including pinene, bergapten, cadinen, falcariindiol, ligustilide, Umbelliferone, and Vanillic acid. etc.

22) *Leonurus heterophyllus* Sweet. (Fam. Lamiaceae) found grown in waste places, hillsides, roadsides and gardens through Central and Western Asia. This plant has been reported to be an annual or biennial reaching 1m. The flowers are hermaphrodite (have both male and female organs) and are pollinated by bees. The plant is found in sand loam soils. It is used in traditional medicine as an antibacterial, antifungal, birthing aid, contraceptive, depurative, emmenagogue, hypotensive, ophthalmic and women's complaints etc.



Photo 10. A photo of a young plant of *Leonurus heterophyllus* grown in northern New Jersey, 2001.

CONCLUSIONS

From Uzbekistan, we collected germplasm of *Acorus calamus*, *Echinacea purpurea*, *Ephedra equisetina*, *Rhamnus dahurica*, *Salvia sclerea*, *Zizyphus jujuba*; and from Kyrgyzstan: *Aerva lanata*, *Agrimonia asiatica*, *Althea cannabika*, *Ammi majus*, *Bidens tripartita*, *Bryonia albi*, *Calendula officinalis*, *Chelidonium majus*, *Conium maculatum*, *Foeniculum vulgare*, *Filipendula hexapetala*, *Hyssopus*

seravschanicus, *Inula grandis*, *Lavandula vera*, *Leonurus turkestanicus*, *Linum usitatissimum*, *Ocimum basilicum*, *Pastinaca sativa*, *Potentilla erecta*, *Inula helenium*, *Ricinus communis*, *Salvia officinalis*, *Sanguisorba officinalis*, *Silybum marianum*, *Scutellaria baicalensis*, and *Valeriana officinalis*. This germplasm collected from Central and Western Asia is now being evaluated in New Jersey with the objective of identifying new crop opportunities for New Jersey or for other regions of US and Canada. The New Jersey climate and soil appear well suited for the production of many but clearly not all of the collected medicinal plants from Central and Western Asia. Should these plants be adaptable to our region and market demand is strong, then the commercial introduction of those promising plants could be provide new botanical sources or extracted phytopharmaceutical compounds for the pharmaceutical industry and the botanical/dietary supplemental industry in the US.

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