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## Power Plants: Green Pharmacy

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For thousands of years human beings have made medicines from the plants, which surrounded them. In recent times, pharmaceutical companies have gathered or synthesized the active compounds from these plants, stabilized them, and intensified them for broad distribution and long (and profitable) shelf lives. It is well known that every substance when used in the right dose and way has medicinal value but it is wrong to believe that natural products are free of any side effects. To mention an example is honey, when its taken in excess can cause liver damage due to its high fructose content. The only reason why people suffer from the side effects of the medicine is because they are not used properly. Some of the medicinal plants that were taken for discussion are, milk thistle, black cohosh, bilberry, hawthorne, horse chestnut, honey, turmeric, White, red, purple, yellow and green vegetables and fruits, ephedra, grapefruit juice and drug interactions and saw palmetto.

### Milk thistle:

Milk thistle, *Silybum marianum*, is also known as, Marian Thistle and Silybum. The fruits, seeds, flowers, stem and leaves are used for medicinal purposes. Milk thistle is indigenous to Europe and now grows in Asia, east USA and California. The 70 to 150 cm high annual or biennial plant has an erect stem, broad wavy, lanceolate alternate leaves, purple to red-purple flowers in large solitary inflorescence, and brown spotted glossy small fruits with a white tuft of hair. The fruits are also called Kenguil seeds. Milk thistle has been shown to contain flavonolignans, silymarin, which is a mixture of silibinin, silidianin, and silicristin. Other constituents found include flavonoids, beta-sitosterol polyenes and fatty oil.

Milk Thistle is used for chronic or functional disorders of the liver and gallbladder, cirrhosis, hepatitis or jaundice, gallbladder colic, gallstones, damage from alcohol abuse and harmful chemicals and to promote milk production in breast-feeding mothers. It is also used for skin conditions like psoriasis, eczema, erythema, sores, wounds, burns, and

aging skin. Some applications may not have scientific documentation. Milk thistle preparations for oral use include capsules of concentrated extract of standardized herb, liquid extract, tinctures and teas. It is also available for topical application.

In proper doses, milk thistle is safe to use and no side effects or health hazards are known. There may be a mild laxative effect, which can be countered by taking some fibers like psyllium, pectin, oat bran, or guar gum, to stop the loose stools and any stomach discomfort. Persons with liver disorder should not use alcohol-based extracts and should consult their doctors about the proper amount of milk thistle they can have. Persons with any serious medical condition should consult their doctor before taking milk thistle. It is safe to take milk thistle with other herbs, drugs and nutritional supplements.

### Black cohosh:

Black cohosh is *Cimicifuga racemosa*. It is also known as, Squaw Root, Rattleroot, Black Snake Root, Rattle weed, Richweed, Bugwort, Bugbane and Cimicifuga. The fresh and dried roots and rhizomes are used for medicinal purpose. The black cohosh is native to North America especially Canada and USA, and is cultivated in Europe. The 1 to 1.5

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m high plant grows in shady forests in USA and Canada. It is a perennial with a sturdy, stout, black rhizome, straight, strong dark brown roots, double-pinnate smooth leaves, and small white flowers in a drooping raceme. The rhizome and roots are harvested in autumn. The roots and rhizomes of this plant have been found to contain cimicifugin (macrotin), isoflavone formononetin, triterpene glycosides, phenylpropane derivatives, resin, fatty acids, tannins, sugars and starch.

Black cohosh is used mainly to relieve problems of female origin and there have been scientific studies carried out on this. These problems include menstrual cramps, painful menstruation, and premenstrual syndrome. Menopause including hot flashes, vertigo, headaches, heart palpitations, tinnitus and the psychological effects like depression, irritability and nervousness. Dryness and discomfort in the vagina. Black cohosh is also used to treat arthritis, rheumatism, sciatica, muscular and neurological pain, respiratory congestion, mild hypertension, and nervous conditions. There has not been any study done to confirm the efficacy and veracity of the treatment for these disorders.

Black cohosh is available in the form of capsules, tablets and liquid tincture for use with water. Dried root is used after prepared as a tea. To treat tinnitus black cohosh is usually used in combination with the herb *Ginkgo biloba*. Black cohosh is also used in combination with other herbs in treatments for menopause.

Pregnant women in the first six months of pregnancy must not take black cohosh, as it can cause premature birth. It may be given towards the end of the pregnancy to stimulate labor. No side effects or health hazards are known when black cohosh is taken in prescribed doses. High doses can cause nausea, diarrhea, vomiting and abdominal pain. There may also be headaches, dizziness, tremors, visual dimness, joint pain, and slow heart rate. Black cohosh should not be taken with oral contraceptives or synthetic estrogen as it may intensify the side effects of those drugs. Black cohosh should not be confused with blue cohosh, which is also used for similar problems but has not been much studied and its safety is not known.

#### **Bilberry:**

*Vaccinium myrtillus* is also known as, huckleberries in US, whortleberries in UK and Scottish people know them as blaeberrys. Bilberry is a perennial, ornamental shrub that is commonly found in various climates in damp woodlands. There are over 100 species with similar names and fruit

throughout the Europe, Asia and North America. Normally the berries and leaves are used.

Bilberry has been reported to contain mainly vitamin A, C and a pigment known as anthocyanin. Vitamin A normally helps to get sharp vision. Vitamin C helps form collagen and is needed for growth and repair of tissue and blood vessels. Anthocyanins are believed to support and protect collagen structures in the blood vessels of the eyes, assuring strong, healthy capillaries that carry vital nutrients to eye muscles and nerves. Bilberry is used to treat glaucoma and macular degeneration, and the active ingredients responsible are believed to be the anthocyanin pigments. Bilberry also contains glucoquinine that has the ability to lower blood sugar. Bilberry standardized extract containing 25% anthocyanins is available. Some studies suggest that 80- to 160-mg capsules work the best. Most dark-colored fruits, such as blueberries, blackberries and cranberries all contain anthocyanins and may be very good to consume. There are no known or reported side effects and precautions associated with the use of bilberry.

#### **Hawthorn:**

Hawthorn is *Crataegus oxyacantha*. The perennial hawthorn trees with their white rose-like flowers are considered one of the most beautiful spring flowering shrubs. The parts of this tree that are most used include, berries, young stems, leaves, and flowers. Hawthorn has been reported to contain three groups of compounds which are essential to the plant's positive effects on the cardiovascular system. These constituent groups are the triterpenoid saponins, the amines and the flavonoids. By inhibiting free radical formation, hawthorn's antioxidant activity can be beneficial in maintaining healthy coronary vessels and promoting overall cardiac health.

Hawthorn in combination with other drugs is given for cardiac problems such as palpitations, angina, and rapid heartbeat. Studies have shown that the herb restores blood pressure to normal. The herb appears to increase the power of the heart's contractions, making the organ more efficient. It helps prevent irregular heartbeats called arrhythmias, which can lead to heart attacks. Hawthorn is also a diuretic, treat digestive problems, nervous tension, insomnia, and sore throat. Combined with *Ginkgo biloba* it works to enhance poor memory by improving circulation of blood within the head and increasing the amount of oxygen to the brain. Side effects and precautions associated with the use of hawthorne have not been reported so far.

Hawthorne is best consumed as a tea made out of two teaspoons of crushed leaves per cup of boiling water which is steeped for about 20 min. This tea is to be taken two cups a day. Hawthorn tastes bitter so it needs to be sweetened with sugar or honey. Normally it takes months before any benefit is noticed and it is recommended that it should be used only under physician's consultation.

#### **Horse chestnut:**

Horse chestnut is the plant *Aesculus hippocastanum*. Horse chestnut is reported to contain an active compound called aescin. It is used mainly to help prevent varicose veins and hemorrhoids. Both conditions develop when small blood vessels become weak and develop distended pouches where blood pools and tissue swells. Horse chestnut extracts strengthens capillary walls, preventing this pooling and swelling. Horse chestnut is available in the form of tablets and capsules commercially and it is recommended to take these as these are supposed to be detoxified and hence are safe to use. The most recommended dose is 50 mg of the active compound aescin 2-3 times a day. No significant side effects have been reported. However, horse chestnut's seeds are really poisonous so direct usage is to be avoided.

#### **Honey:**

There is a wrong perception that all honey comes from flowers. Presently a lot of honey is being collected in 'Rubber estates' from tender (new) leaves of rubber. Research papers have been published on this and honey collection has become a profitable by-product in large rubber plantations. The medicinal properties of honey will vary depending on its origin.

#### **Turmeric:**

Indian curries are most delicious throughout the world. Turmeric, *Curcuma longa*, is well used in Indian curries. It is a natural COX-2 inhibitor and a pain reliever. Curcumin has already been shown to reduce the risk of several types of cancer by British researchers. Various studies and investigations have shown that turmeric and curcumin have positive results with respect to antiinflammatory activity, free radical scavenging activity, radio protective, anticancer activity and antiinfective activity. Turmeric containing local preparations have very good cosmetic value globally. Traditional preparations from India with turmeric, tulsi, arjuna and neem demonstrate wonderful therapeutic, nutritional and cosmetic value. Indian spices, medicinal plants are real treasure for us.

#### **White, red, purple, yellow and green vegetables and fruits:**

White foods may lower cancer risks and help in maintaining heart health. Cruciferous vegetables, such as cauliflower, may inhibit the growth of some types of cancer. Onion family contains alicin, which may help reduce cholesterol and blood pressure. Other examples are bananas, garlic, ginger, mushrooms, turnips, white nectarines, white peaches and white potatoes. Blue/purple fruits and vegetables contain anthocyanins and phenolic acids. Further research is in progress to understand their antioxidant and antiageing properties. Few examples are black currants, blueberries, eggplant, plums, purple grapes and purple potatoes. Red foods contain anthocyanins and/or lycopene which protect the heart, preserve memory and reduce the risk of some cancers. Lycopene found in abundance in tomatoes is known to help in prostate cancer. Other examples are beets, cherries, raspberries, red pepper, rhubarb, strawberries and watermelon. Orange or yellow foods contain antioxidants, vitamin C and phytochemicals namely carotenoids and bioflavonoid, which seems to improve vision, immunity and heart health. Examples are apricots, carrots, cantaloupe, lemons, mangoes, oranges, papayas, pineapple, pumpkin, yellow pears and yellow squash. Green vegetables contain lutein and indoles, which may lower the risk of some cancers and promote vision. Lutein offers a natural UV protection and may help reduce the risk of macular degeneration and cataracts. Examples are avocados, beans, broccoli, green apples, green grapes, green salads, honeydew, limes, peas, and zucchini to mention a few.

India has a great treasure of medicinal plants. The fruits of bixa contain natural red colour which is used in pharmaceuticals and foods. Garcinia of Western Ghats in India is another good nutraceutical and a pharmaceutical raw material. Cocoa butter prepared from this plant is used in cosmetics, ointments, creams, suppositories and pessaries. The fruit is useful for preparing base for chocolates, colouring agent and as flavours.

#### **Ephedra:**

Ephedra, also known as 'ma huang', is a dietary supplement. The over-the-counter stimulant ephedrine (or xenadrine), often used to increase endurance and lose weight, is under increasing scrutiny for its possible health risks. While the precise hazards are still unclear, a variety of reports have linked its use to heart attacks, strokes, seizures, and heatstroke. The concern results, in part, from

reports to the FDA of people falling ill or even dying after taking the supplements. Two years ago, researchers of the University of California, reviewed 140 of these reports. They concluded that one-third of the cases definitely or probably resulted from ephedrine, and another third possibly did. These included 10 deaths and 13 cases of permanent impairment. The most commonly reported ill effects were heart related, including high blood pressure, palpitations and heart attacks. Strokes and seizures, especially in outwardly healthy young adults, were also apparently triggered by ephedrine.

### **What is the cause of the grapefruit juice-drug interaction?**

In United States, drug interactions with grapefruit Juice are in the limelight. Known and anticipated drug interactions with grapefruit juice are for calcium-channel antagonists, HMG-Co A reductase inhibitors, immunosuppressants, sedative-hypnotics and anxiolytic agents, other psychotropic agents, antihistamines, human immunodeficiency virus protease inhibitors, hormones and many other drugs.

Certain compounds in grapefruit juice act on the small intestine where the bulk of drug absorption occurs. After you swallow a pill, it usually passes through your stomach, then the pill dissolves in the small intestine and the drug is absorbed. The small intestine, however, has developed clever ways to prevent foreign substances from being absorbed. First, a protein called P-glycoprotein, or "P-gp," for short, acts like a bouncer in front of a nightclub. If P-gp doesn't like the way the drug looks, P-gp just pumps the drug back into the intestine. That way, the drug never gets into the blood circulation. The second way the body defends itself is through an enzyme called Cytochrome P450 3A (CYP3A). It is one the most important enzymes in the body. Its main job is to metabolize or transform drugs into forms that are easier to eliminate, and it prevents the unsafe build-up of drugs in the body. There is a large quantity of CYP3A in the liver and in the small intestine. Grapefruit juice has compounds in it that block P-gp and CYP3A from acting and thus increases the concentration of those drugs that are metabolised by these enzymes or have poor bioavailability due to P-gp efflux of drugs.

However, it should be noted that significant interaction occurs only when concentrated grape juices are used which

is much common in America. This interaction can be used in beneficial ways for drugs like cyclosporine. In future we can have them in the formulation of those compounds which have a poor bioavailability. Research should also be done on other citrus fruits as well to see if they also exert this kind of reaction.

According to Dr. Flockhart of Georgetown University Medical Centre, grapefruit juice acts as inhibitor for those drugs which are metabolised by CYP3A. Examples of these drugs include alprazolam, buspirone, calcium channel blockers, carbamazepine, cisapride, cyclosporine, HIV protease inhibitors, lovastatin (but not pravastatin), simvastatin, midazolam, pimozide, tacrolimus, triazolam and zolpidem.

### **Saw Palmetto:**

Behind James Duke's house in Maryland lays a half-acre medicinal garden. He retired in 1995 after 27 years with the US Department of agriculture where he was a medicinal plant expert. Duke, now 73, has created a lush, terrace herb garden containing some 300 medicinal plants arranged by the conditions they help treat or prevent. Duke grows them not just because he's a scientist and author of *The Green Pharmacy* herbal handbook but because he is a patient. On the terrace, by a stone marker that says prostate problems, are rows of saw palmetto plants which Duke has used for 10 years to treat an enlarged prostate.

### **For more reading and References:**

*The Green Pharmacy* by James A. Duke, Ph.D. (Rodale, 1997), *The Herbal Drugstore* by Linda B. White, MD and Steven Foster (Rodale, 2000), *The Encyclopedia of Popular Herbs* by Robert S. McCaleb and the Herb Research Foundation (Prime Publishing, 2000), *The New Healing Herbs* by Michael Castleman (Rodale, 2001), *HerbalGram, The Journal of the American Botanical Council* (toll-free 800-373-7105) or [www.herbalgram.org](http://www.herbalgram.org), a useful site for information on medicinal plants.

<http://www.wtop.com/index.php?nid=106&sid=45967>, <http://www.drug-interactions.com/> or contact: [Flockhad@gusum.georgetown.edu](mailto:Flockhad@gusum.georgetown.edu), Medizine, healthy living.

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