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The Herbal Dispatch

A monthly publication of the Medicinal Botanical Program

The goal of this newsletter is to inform readers of the Program's educational, research and outreach activities and events; and of results of the latest research on the chemistry, cultivation, processing and preventive and therapeutic use of herbs, botanicals and vegetables

The views expressed in The Herbal Dispatch are those of the individual authors and do not necessarily reflect those of MSU or the Medicinal Botanical Program staff

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Obesity increases risk of kidney failure seven fold

Researchers at the University of California, San Francisco have determined that there is a strong relationship between being obese and developing end-stage renal disease, or kidney failure.

The long-range study found that the obese have up to a seven times greater risk of kidney failure than normal weight people, suggesting that obesity should be considered a risk factor for the condition, and that kidney failure is yet another consequence of obesity.

"There are more and more people with kidney failure, but it hasn't been appreciated much that kidney failure can be a consequence of obesity," said Chi-yuan Hsu, MD, UCSF assistant professor of medicine and lead author of the study. "We think this study is important because it demonstrates quite convincingly that people who are obese or overweight are at much higher risk of kidney failure."

The study, published in the January 3 issue of the *Annals of Internal Medicine*, was conducted jointly with Kaiser Permanente of Northern California Division of Research.

Research findings showed that being even moderately overweight nearly doubles the risk of developing the condition, which is a complete failure of the kidneys to process waste so that dialysis or transplantation become necessary.

"If you are mildly overweight, not even frankly obese, you are roughly 90 percent more likely to develop end-stage renal failure," Hsu said, with the risk reaching over 700 percent greater for the morbidly obese.

The research is based on data derived from over 320,000 Northern California Kaiser members whose height and weight were measured during health checkups between 1964 and 1985. A total of 1,471 cases of end-stage renal disease occurred among study participants during an



average follow-up period of about 26 years. Cases of end-stage renal disease were determined using the U.S. Renal Data System, a comprehensive national registry that collects and disseminates information on end-stage renal disease.

Researchers calculated the body mass index (BMI) of study participants and found that those with a higher BMI were at greater risk of kidney failure.

BMI is weight in kilograms divided by height in meters squared. A BMI of over 25 defined a person as overweight, and BMI of over 30 moved a person into class I obesity. Class II obesity was defined as BMI of 35 to 39.9, and class III obesity (or morbid obesity) was defined as a BMI of 40 or above. A five-foot-ten-inch man weighing 160 pounds would have a BMI of 23. If he weighed 190 pounds he would be overweight with a BMI of 27.3. At 220 pounds he would be obese with a BMI of 31.6.

Of the study participants, 58 percent were of normal weight and 39 percent had a BMI of 25 or greater. The risk of kidney failure among "overweight" study participants was 1.87 times that of normal weight participants, or nearly 90 percent greater. The most obese study participants, with a BMI of 40 or above, had over seven times the risk of kidney failure.

More than 400,000 Americans receive long-term kidney dialysis and more than 20,000 have a functioning transplanted kidney. The number of people who suffer from end-stage renal disease is projected to increase to more than 650,000 by 2010, with associated Medicare expenditures of \$28 billion. Kidney failure is ninth among the leading causes of death in the United States, with an annual death rate of about 20 percent a year.

Traditional risk factors for end-stage renal disease are high blood pressure and diabetes, Hsu said. But the study found that obesity remained a risk factor, even after adjustment for blood pressure and diabetes status. Most kidney doctors don't think of weight loss as a potential way of reducing kidney failure, he added. The study suggests that kidney doctors should calculate their patients' BMI when evaluating their risk of kidney failure.

Hsu said one reason for the higher rate of kidney failure among obese patients might be that they are more likely to develop diabetes and hypertension. Another reason is that obesity places more metabolic demand on the kidneys, forcing them to work harder. "As the person gets bigger, hyper-filtration occurs and this over filtration is what tears the kidneys down."

It has long been appreciated that obesity is linked to heart disease, high blood pressure, and diabetes, among other ailments. Now, kidney failure should be added to that list, Hsu said.

"Kidney failure is yet another bad thing that is likely to happen to you, if you are obese. This is a bad thing that was not previously recognized," he said.

Study co-authors are Charles E. McCulloch, PhD, of UCSF, and Carlos Iribarren, MD, MPH, PhD; Jeanne Darbinian, MPH, and Alan S. Go, MD, of Kaiser.

Medical Study News, 1-8-2006

Indian Pink (*Spigelia marilandica*L.)

**By David C. Carman
Grower and Collector
Princeton, West Virginia**

Indian Pink, a member of the Loganiaceae family, is a valuable medicinal perennial herb. It is also known as pinkroot, Carolina pinkroot, Maryland pink, unstillia, snakeroot, perennial wormgrass, American wormroot, wormweed, wormgrass, and star bloom.

The plant grows to two feet in height and has opposite, sessile, ovate to lance-shaped leaves. The blooms are produced at the top, along one side of the stem.

Indian pink is a beautiful wild flower whose dark-green leaves sharply contrast with the vivid scarlet and yellow colors of its blossoms, clearly visible

from a distance.

Indian pink should never be removed from its wild habitat, should one be fortunate enough to find it in the wild. The plant is too rare to harvest. Those wishing to grow Indian pink should obtain specimens or seeds from established growers.

This is a good plant for the medicinal herb grower to produce; however, as Virginia snakeroot, it has a small root system and requires large plantings to be profitable.

The plant may be grown in partial shade to full sun. It thrives in moist, humus-rich soil.

A word of caution: this plant contains spigeline, a toxic alkaloid.



College of Charleston, SC

Protective action of a hexane crude extract of *Pterodon emarginatus* fruits against oxidative and nitrosative stress induced by acute exercise in rats

Paula, FBA; Gouvêa, CMCP; Alfredo, PP; and Salgado, I.
BMC Complementary and Alternative Medicine 2005, 5:17

Background. The aim of the present work was to evaluate the effect of a hexane crude extract (HCE) of *Pterodon emarginatus* on the oxidative and nitrosative stress induced in skeletal muscle, liver and brain of acutely exercised rats.

Methods. Adult male rats were subjected to acute exercise by standardized contractions of the tibialis anterior (TA) muscle (100 Hz, 15 min) and treated orally with the HCE (once or three times with a fixed dose of 498

mg/kg), before and after acute exercise. Serum creatine kinase activity was determined by a kinetic method and macrophage infiltration by histological analyses of TA muscle. Lipid peroxidation was measured as malondialdehyde (MDA) levels. Nitric oxide production was evaluated by measuring nitrite formation, using Griess reagent, and nitrotyrosine was assessed by western blotting.

Results. Serum creatine kinase activities in the controls (111 U/L) increased 1 h after acute exercise (443 U/L). Acute exercise also increased the infiltration of macrophages into TA muscle; lipid peroxidation levels in TA

muscle (967%), liver (55.5%) and brain (108.9%), as well as the nitrite levels by 90.5%, 30.7% and 60%, respectively. The pattern of nitrotyrosine formation was also affected by acute exercise. Treatment with HCE decreased macrophage infiltration, lipid peroxidation, nitrite production and nitrotyrosine levels to control values.

Conclusion. Acute exercise induced by functional electrical stimulation in rats resulted in increase in lipid peroxidation, nitrite and nitrotyrosine levels in brain, liver and skeletal muscle. The exercise protocol, that involved eccentric muscle contraction, also caused some

muscle trauma, associated with over-exertion, leading to inflammation. The extract of *P. emarginatus* abolished most of these oxidative processes, thus confirming the high antioxidant activity of this oil which infusions are used in folk medicine against inflammatory processes.



Contributor's Corner: *Schisandra chinensis* (Wu-wei-zi fruit)

By Jennifer J. Stagg, N.D.
Huntington, WV

I. Traditional uses, plant portions, dosages and products available

Plant portion and historical use. The fully ripe, sun-dried fruit is used medicinally. It is purported to have sour, sweet, salty, hot, and bitter tastes. This unusual combination of flavors is reflected in Schisandra's Chinese name wu-wei-zi, meaning "five taste fruit." The classical treatise on Chinese herbal medicine, the *Shen Nung Pen Tsao Ching*, describes schisandra as a high-grade herbal drug useful for a wide variety of medical conditions—especially as a kidney tonic and lung astringent. In addition it was noted that Schisandra is useful for coughs, night sweats, insomnia, thirst, and physical exhaustion.

In western medicine it is thought that this herb's adaptogenic properties increase resistance to a wide range of physical, chemical, and emotional stresses while promoting improved overall regulation of physiological processes. It is considered astringent in nature and is indicated in cases of chronic cough and dyspnea, diarrhea, night sweats, wasting disorders, irritability, palpitations, dream-disturbed sleep, and insomnia.

Dosage. This varies according to the source. One source quotes 1.5–15 grams per day of the berry. The tincture, in the amount of 2–4 ml three times per day, can also be used. Another source states therapeutic dosages are 400–450 mg powdered herb in capsules three times daily or 1–2 ml of 1:3 EtOH

tincture of Schisandra three times daily. Toxic doses when orally administered to mice were approximately 10 to 15g/kg. Overdose symptoms include restlessness, insomnia and dyspnea

Products. Dimethyl-4,4'-dimethoxy-5,6,5',6'-dimethylenedioxybiphenyl-2,2'-dicarboxylate (DDB), a synthetic analogue of Schizandrin C, is a useful chemotherapeutic agent for the treatment of BEL-7402 human hepatocarcinoma when used in combination with 6-mercaptopurine.

It is also available in tincture form from most companies as well as mixes such as *Energy Vitality* (Gaia Herbs), *Alert* (Phytopharmica) which is standardized to 9% schinzandrin, *Gintonia* and *Echatin Plus* (NF Formulas).

II. Mechanism of action and active constituents

Research into the active ingredients is primarily focused on the various lignans and essential oils contained in the dried fruits of Schizandrae. The major chemical constituents include schizandrin, deoxyschizandrin, schisanhenol, schizandrol, sesquicarene, β -chamigrene, citral, stigmaterol, and vitamins C and E.

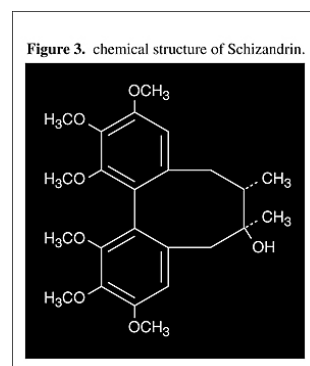
Lignans

The lignans (schizandrin, deoxyschizandrin, gomisins, and pregomisin) are found in the seeds of the fruit.

Hepato-protective: Pharmacological studies on the bioactive lignans in Schizandra found they increased liver protein and glycogen synthesis, inhibited carbon tetrachloride induced lipid peroxidation, and had an

inducing effect on the cytochrome P-450 enzyme system (Li XY. Bioactivity of neolignans from fructus Schizandrae. *Mem Inst Oswaldo Cruz* 1991;86:31-37.)

Schizandrin B has been shown to activate the enzymes in liver cells that produce glutathione. (Ip SP, Poon MKT, Wu SS, et al. Effect of schizandrin B on hepatic glutathione antioxidant system in mice: Protection against carbon tetrachloride toxicity. *Planta Med* 1995;61:398–401).



Role in inflammation: The lignans interfere with platelet activating factor, a chemical that promotes inflammation in a number of conditions. (Jung KY, Lee IS, Oh SR, et al. Lignans with platelet activating factor antagonist activity from *Schisandra chinensis* (Turcz) Baill. *Phytomedicine* 1997;4:229–31.)

Antioxidant Potential: Seven of the nine lignans from Schizandrae were found to inhibit vitamin C/NADPH induced lipid peroxidation in rat liver microsomes. Of these compounds, schisan-henol and schizandrin were shown to be more effective than vitamin E at the same concentration. Schizandrins B and C were found to have

strongest scavenging effect against active oxygen radicals. (Li XJ, Zhao BL, Liu GT, Xin WJ. Scavenging effects on active oxygen radicals by schizandrins with different structures and configurations. *Free Radic Biol Med* 1990;9:99-104)

When these compounds were given orally to mice at 15 ml/kg, there was significant reduction in ethanol induced malondialdehyde formation with increased superoxide dismutase and catalase activity. (Lu H, Liu GT. Effect of dibenzo[a,c]cyclootene lignans isolated from fructus Schizandrae on lipid peroxidation and anti-oxidative enzyme activity. *Chem Biol Interact* 1991;78:77-84)

Anti-bacterial Effect: Decoctions of Schizandrae were found to possess strong in vitro inhibitory action on *Bacillus subtilis*, *Bacillus dysenteriae*, *Bacillus typhi*, and *Staphylococcus aureus*. (Hong YH. *Oriental Materia Medica: A Concise Guide*. Long Beach, CA: Oriental Healing Arts Institute; 1986)

III. Basic and clinical research evidence

Clinical

Adaptogen

Schizandra chinensis and *Bryonia alba* extracts increased the concentration of NO and cortisol in blood and saliva similar to athletes with heavy physical exercise (since heavy physical exercise increases the content of nitric oxide and cortisol in blood and saliva) but does not increase NO and cortisol in athletes who perform physical exercise.

Contributor's Corner: *Schisandra chinensis* (Wu-wei-zi fruit) (Cont'd)

(Panossian AG, Oganessian AS, Ambartsumian M, Gabrielian ES, Wagner H, Wikman G. Effects of heavy physical exercise and adaptogens on nitric oxide content in human saliva. *Phytomedicine* 1999 Mar;6(1):17-26).

Hepatoprotective

SGOT and SGPT were decreased by Schisandrin C (effect of dimethyl-4,4'-dimethoxy-5,6, 5',6'-dimethylene dioxybiphenyl-2,2'-dicarboxylate (HpPro)) in a week, orally 7.5 mg/d X3, in a study of 56 patients with acute and chronic liver diseases (16 acute hepatitis, 20 chronic hepatitis, 14 cirrhosis and 6 fatty liver). An open trial and a prospective randomized and controlled study were performed. The open trial consisted of 56 cases (16 cases of acute hepatitis, 20 cases of chronic hepatitis, 14 cases of liver cirrhosis and 6 cases of fatty liver). Controlled study consisted of 20 cases of Child A chronic hepatitis which were randomly treated with either HpPro or a mixture of known drugs which used as a liver protective agent in Indonesia as control for one week. The patients were then crossed over those two drugs in the next week. In the open trial, after 4 weeks' treatment with HpPro 7.5 mg orally three times daily, acute hepatitis, chronic hepatitis and fatty liver cases showed rapid decrease of SGOT and SGPT. In the liver cirrhosis cases, SGOT and SGPT were decreased slowly. In the controlled trial, nine patients received HpPro 7.5 mg three times daily orally and eleven were treated with a mixture of known drugs as the controls. After one week treatment, HpPro group clinically showed significant decrease of SGPT and SGOT

levels compared to control group (P = 0.035). At the second week, HpPro group showed significant decrease of SGOT compared to control group (P = 0.038) but the decrease of SGPT was not significant (P = 0.096). CONCLUSION: Treatment with HpPro is effective to reduce liver impairment in acute and chronic liver diseases on Indonesian patients. No side effect of HpPro was observed. (Akbar N, Tahir RA, Santoso WD, Soemarno, Sumaryono, Noer HM, Liu G Effectiveness of the analogue of natural Schisandrin C (HpPro) in treatment of liver diseases: an experience in Indonesian patients. *Chin Med J* 1998 Mar;111(3):248-51)

In a controlled trial, Chinese patients with chronic viral hepatitis were given 500 mg schisandra extract three times daily or liver extract and B vitamins. Among those given schisandra, serum levels glutamic pyruvic transaminase (SGPT) levels declined to normal levels in 68% compared to 44% of the control group. Lower SGPT levels suggest less liver inflammation. There was also a reduction in symptoms such as insomnia, fatigue, loose stools, and abdominal tension in the schisandra group. (Liu KT. Studies on *fructus Schisandrae chinensis*. Annex 12: Studies on *fructus Schisandrae chinensis*. Plenary lecture, World Health Organization Seminar on the Use of Medicinal Plants in Health Care, Sept 1977, Tokyo, Japan. In: WHO Regional Office for the Western Pacific Final Report, Manila, 1977:101-12)

An uncontrolled study in 5,000 persons with various types of hepatitis found normalizations in SGPT or related liver

enzymes in 75% of cases using an unspecified amount of schisandra. (Chang HM, But P (eds). *Pharmacology and Applications of Chinese Materia Medica* vol 1. Singapore: World Scientific, 1986.)

IV. Predicted or documented drug or disease interactions

Documented:

Two cases of interaction between cyclosporine* and Dephenyl-dimethyl-dicarboxylate (PMC), (a hepatotonic drug, is a substance derived from the synthesis of *Schisandrae fructus* elements) in kidney transplants patients with chronic hepatitis where cyclosporine decreased to a subtherapeutic level. CsA troughs decreased markedly to a subtherapeutic level following administration of PMC. The authors, therefore, suggest that PMC could decrease the CsA trough level and thus a close monitoring of the CsA trough level is necessary during a PMC therapy. (Kim YS, Kim DH, Kim DO, Lee BK, Kim KW, Park JN, Lee JC, Choi YS, Rim H. The effect of diphenyl-dimethyl-dicarboxylate on cyclosporine-A blood level in kidney transplants with chronic hepatitis. *Korean J Intern Med* 1997 Jan;12(1):67-9.)
*Cyclosporine is metabolized by p450 3A4,5,7.

Intragastric gavage of schisandrin B (Sin B) and schisanhenol (Sal) 200 mg/kg once daily for 3 d significantly increased liver glutathione-S-transferase (GSH-S-T) and microsomal cytochrome P-450 in mice and rats. Sin B and Sal antagonized the increase of uterus weight induced by sc estradiol in ovariectomized, and decreased serum estradiol level in mice. RIA and HPLC

showed an enhancement in [3H] estradiol metabolism by liver microsomes from Sin B- and Sal-treated mice. The results indicated that both Sin B and Sal have inductive actions on drug metabolizing-phase I and phase II enzymes in mice and rats. (Lu H, Liu GT. Effects of schisandrin B and schisanhenol on drug metabolizing-phase II enzymes and estradiol metabolism. *Zhongguo Yao Li Xue Bao* 1990 Jul;11(4):331-5)

In a study of rats given liver-damaging amounts of acetaminophen, gomisin A (a lignan found in *Schisandra*) appeared to protect against some liver damage but did not prevent glutathione depletion (unlike milk thistle). Studies have not yet confirmed this action in humans. (Yamada S, Murawaki Y, Kawasaki H. Preventive effect of gomisin A, a lignan component of *Schisandra* fruits, on acetaminophen-induced hepatotoxicity in rats. *Biochem Pharmacol* 1993;46:1081-5)

Predicted

Based on the above studies *Schisandra* could potentially interfere with drugs metabolized by Phase I (p450) and Phase II (glutathione) detox in the liver.



Appalachian Plant Profile: Bearberry

By Dean Myles, Coordinator
Medicinal Botanicals Program
Mountain State University

Arctostaphylos uva-uris Spreng. is a trailing evergreen shrub native to Northern Europe and northern North America [1]. *A. uva-uris* occurs in northern Appalachia, Canada, and the western US and is commonly known as bearberry or kinnikinnick. Bearberry reaches 4 to 10 inches in height and spreads up to two feet [2]. Bearberry has short creeping branches reddish-brown in color. The one-inch long shiny, leather-like spatula-shaped leaves have an alternate arrangement. Bearberry flowers in May thru July. The flowers are 1/4 inch in length and have a whitish-pink color. The fruit is a red berry between 1/4 and 1/2 inch in diameter. The fruit ripens in August and persist throughout winter.

Bearberry is long-lived and cold tolerant [3]. Like most cold tolerant species, bearberry is low growing. Bearberry is considered to be a pioneer species, quickly regenerating after fire. Bearberry inhabits forests, sand dunes, and bald or barren areas with well-drained soil. Bearberry is adapted to growing in areas ranging from full sun to partial shade. Bearberry can persist on a wide range of soil textures and nutrients. Woody species associated with bearberry are paper birch (*Betula papyrifera*), white spruce (*Picea glauca*), black spruce, (*P. mariana*), jack pine (*Pinus banksiana*), and quaking aspen (*Populus tremuloides*)

[3, 7]. Seed dispersal is by birds and mammals. The ripe berries are the favorite food of the black bear, hence the name [7].

Bearberry may be propagated by seed, rhizome divisions and stem cuttings [2, 5]. Propagation from seed is difficult. The seed requires scarification and stratification [2, 3, 5]. Scarification begins with a 30-minute sulfuric acid bath and a lime covering [5]. Then the seeds are soaked in water for 24 hours. Next the seeds go through a 60 day warm moist stratification followed by a 90-day cold moist stratification. Germination will take 3 to 4 weeks with true leaves appearing about two weeks after germination. An alternative scarification method is to place the seeds 1/2 cm below the soil surface and cover them with a 7-10 cm layer of pine needles, which is then burned. The flats are left outside, stratifying over winter. Root divisions are made during dormancy and planted in appropriate areas. However, root divisions have a high mortality rate. Stem cuttings is the preferred method of propagation. Stem cuttings are made in early April. Cut stem pieces 10-15 cm in length removing the lower leaves. Treat cut end with rooting hormone, plant and place in mist beds. Cuttings will begin to form an adequate root system in about 4 weeks. Once cuttings or seedlings are established they can be moved to production bed spaced 12 inches apart. The leaves are harvested just before full bloom [9].

Traditionally, bearberry has been used for centuries to treat various ailments. The medicinal use of bearberry was known to the Romans, and it first appeared in the *London Pharmacopoeia* in 1788 [1]. Native Americans used bearberry as a substitute for tobacco [6]. The leaves were also used to treat urinary tract infections, kidney stones, and cystitis. A leaf tea was also thought to ward off obesity. Today, bearberry is primarily used to treat inflammations and infections of the urinary tract and diarrhea, due to its strong astringent qualities. Bearberry is also considered to be diuretic, astringent, and anti-inflammatory [8].

Although bearberry is not protected by the US government, it is endangered or rare in Illinois, Indiana, Iowa, Ohio, and Pennsylvania [4]. In areas with abundant populations, leaves may be harvested for personal use. Please contact your state's agency concerning harvesting of wild plants or contact your local native plant program or the National Plants Database at <http://plants.usda.gov/> for species status. Seeds and plants for cultivation can be purchased through reputable dealers and collected from the wild.

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6. Foster, S., Duke, J., (2000) **Medicinal Plants and Herbs Eastern/Central Ed.** Houghton Mifflin Co. NY
7. Species: *Arctostaphylos uva-uris* Accessed on 1/2/06 at <http://www.fs.fed.us/database/feis/plants/shurbs/arcuva/introductory.html>
8. 2000, PDR for Herbal Medicines Thomson Medical Economics, NJ
9. Dindra, K., Craker, L., 1998, 2004 **Growers Guide to Medicinal Plants** HSMP Press Amherst, MA



Please contact your state's Department of Forestry for laws and regulations concerning Bearberry harvest in your area.

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About the Medicinal Botanical Program

This Program was created as a result of a Specific Cooperative Agreement between Mountain State University and the USDA/ARS-Appalachian Farming Systems Research Center in Beaver, WV. The establishment of this agreement came through the efforts of Senator Robert C. Byrd and a Congressional Appropriation. The mission of the Program is to promote the medicinal plant industry through research, education, marketing and outreach. Educational offerings include a Bachelor degree in Herbal Sciences, a symposium and workshops. The Program also conducts research on the chemistry, propagation and cultivation of native medicinal plants.

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Contributions

Dear growers, processors, marketers, and practitioners, would you like to share your knowledge and personal experience on how to produce, process, market and use herbs and aromatic and medicinal plants with our readers? It is

simple. You just have to put your ideas on paper (typed or handwritten) and mail them to us. We will publish your article as space becomes available in subsequent issues of the Herbal Dispatch.

Optional: you may want also to send a short biographical sketch, so our readers can know you better.

Please send contributions electronically or via postal mail to the addresses provided above.

Spring Vegetable and Herb Conference, 5-6 May 2006

Do not forget to send your registration to attend the Spring Vegetable and Herb Conference being organized by the Mountain State University Medicinal Botanicals Program, the USDA-ARS Appalachian Farming Systems Research Center, and the West Virginia Herb Association at the MSU campus in Beckley, WV, for 5-6 May 2006. We are preparing a diverse group of workshops that should satisfy the interests of everyone. There will be workshops on plant propagation, organic production, composting, medicinal foods, cooking, art crafts, marketing, web design, and grant writing. The program also contains a walk that will focus on the identification of native medicinal and edible plants.

Registration Form

First Spring Conference
Production and Marketing of Vegetables and Herbs
May 5-6, 2006

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