

Chapter 8—Forest Botanicals as Flavorings, Medicinals, and Pharmaceuticals

Description of the Product and Its Uses

Culinary Uses

Forests contain a wide assortment of plants that have market potential as food seasonings or flavorings. Herbs are used as seasonings to add flavor, aroma, or color to other foods and as ingredients in beverages such as herbal coffees, teas, or soft drinks. Botanicals used as natural food preservatives are expected to become more important in the future. Other botanicals can be harvested as edible greens, roots, and tubers. Edible flowers that can enhance the appearance of foods are also found.

According to Appropriate Technology Transfer for Rural Areas (ATTRA) (Adam, personal communication), greens and other edible plants commonly harvested from the forested mountains of the Ozarks include amaranth (*Amaranthus retroflexus*), bracken and other ferns (*Pteridium aquilinum*), burdock (leaves, roots) (*Arctium lappa*), carpenter's square (*Scrophularia marilandica*), chickweed (*Stellaria media*), chicory (*Cichorium intybus*), dandelion (leaves, flowers, root) (*Taraxacum officinale*), henbit (*Lamium amplexicaule*), lambsquarters (pigweed) (*Chenopodium album*), milkweed (pods, flowers, shoots) (*Asclepias syriacus*), black mustard (*Brassica nigra*), peppergrass (*Lepidium* spp.), plantain (*Plantago major*), pokeweed (*Phytolacca americana*), purslane (*Portulacca oleracea*), sassafras (leaf, roots for tea) (*Sassafras albidum*), sheep sorrel (*Rumex acetosella*), sow thistle (*Sonchus arvensis*), watercress (*Rorippa nasturtium-aquaticum*), wild garlic (*Allium vineale*), wild leek (*Allium ampeloprasum*), wild mint (*Mentha* spp.), wild onion (*Allium cepa*), winter cress (*Barbarea verna*), and violet (leaf (*Viola* spp.)).

Other plants with potential culinary use include arrowhead (*Sagittaria latifolia*), asparagus (shoots) (*Asparagus officinalis*), beebalm (leaves for tea) (*Monarda didyma*), bellflower (*Campanula rapunculoides*), bellwort (*Uvularia perfoliata*), bitter cress (*Cardamine* spp.), cattail (*Typha angustifolia*), daylily (buds) (*Hemerocallis fulva*), and elderberry (flowers) (*Sambucus canadensis*).

Herbs and Spices

Aspen leaves	Marjoram
Baby's breath	Mullein
Bay leaves	Princess pine
Blueberry leaves	Raspberry
Catnip	Rose leaves and hips
Celery seed	St. John's wort
Chervil	Tarragon
Chicory root	Thistle
Horsetail	Thyme
Labrador tea	Yerba santa

Edible Greens, Roots, or Tubers

Amaranth	Mustard
Arrowhead	Nettle shoots
Asparagus	Oxalis
Beebalm	Peppergrass
Bellflower	Plantain
Bellwort	Pokeweed
Bitter cress	Prickly pear
Bracken and other ferns	Purslane
Burdock	Salmonberry
Carpenter's square	Sassafras
Cattail	Sheep sorrel
Chickweed	Sow thistle
Chicory	Spiderwort
Dandelion	Spring beauty
Daylily	Sumac
Elderberry	Violet
Fiddlehead fern	Watercress
Goatsbeard	Wild yam
Greenbrier	Wild mint
Henbit	Wild onion
Horsetail herb	Wild leek
Jerusalem artichoke	Wild garlic
Lambsquarters (pigweed)	Willow
Maple	Winter cress
Milkweed	Yucca
Miner's lettuce	

Other familiar edible wild plants which may have agroforestry potential include fiddlehead fern (*Matteuccia struthiopteris*), goatsbeard (*Tragopogon* spp.), greenbrier (*Smilax* spp.), horsetail herb (*Equisetum arvense*), jerusalem artichoke (tubers) (*Helianthus tuberosus*), maple (immature seeds) (*Acer* spp.), miner's lettuce (*Claytonia perfoliata*), nettle shoots (*Urtica urens*), oxalis (*Oxalis* spp.), prickly pear (pads) (*Opuntia humifusa*), spiderwort (*Tradescantia virginiana*), spring beauty (tubers) (*Claytonia virginica*), salmonberry (shoots) (*Rubus spectabilis*), sumac (fruits for tea) (*Rhus glabra*), wild yam (*Dioscorea villosa*), willow (*Salix* spp.), and yucca (immature seeds) (*Yucca* spp.). Some of this latter group are considered rare delicacies.

Medicinal and Pharmaceutical Uses

Forest botanicals are also used in the manufacture of a great many medicinal compounds and pharmaceuticals as well as nutritional supplement products.

Medicinal compounds used for naturopathic remedies include a large number of herbs used to make teas, oils, and other products that are alleged to have curative or therapeutic effects on many common ailments. Some of these products may possess no real medicinal properties, yet have long-term established markets and represent a continuing economic opportunity.

Other botanicals do possess specific physical chemistries of interest to manufacturers of pharmaceutical drugs. While modern medical technology has enabled pharmaceutical manufacturers to synthesize many natural chemical compounds, there is renewed interest in exploring medicinal applications of a great many new plant chemicals.

In the future, it will likely become more important to make a distinction between medicinals and pharmaceuticals because the difference in economic opportunities represented by the two types of compounds will become increasingly great. Some experts feel that demand for botanical products that possess desired pharmaceutical chemistries will become much more important than demand for alleged medicinals in the not-too-distant future (Miller, personal communication).

In addition, many botanicals with medicinal uses are also used as foods, in cosmetics, in dyes, as dried florals, and for a variety of other uses (fungicides, insecticides, animal products, and aromatics). Some of these uses are discussed in other chapters.

A complete listing of the hundreds of native plants with medicinal or food-related properties is far beyond the intent of this publication. Also, a great many botanicals lend themselves to small farm production as crops and are therefore less likely to be good prospects for forest harvesting. For example, chamomile, peppermint, garlic,

Medicinal Materials

Balm of Gilead buds
 Balsam gum
 Birch oil
 Biscuit root
 Bitterroot
 Black cherry bark
 Black haw roots
 Bloodroot
 Boneset
 Camas bulbs
 Cascara bark
 Cattail flowers and root starch
 Cohosh
 Dandelion root
 False hellibore roots
 Foxglove leaves
 Ginseng root
 Goldenseal
 Indian breadroot
 Jerusalem oak seed
 Jimsonweed leaves
 Mayapple or mandrake roots
 Oregon grape roots
 Oregon tea
 Princess pine or pipsissewa
 Quinine conks
 Sassafras oil and root
 Scotch broom
 Skunk cabbage roots
 Snakeroot
 Spruce gum
 Storax gum from sweet gum
 Sumac
 Western yew
 Wild garlic
 Wild ginger
 Wild mint
 Wild onion
 Wintergreen oil
 Witch hazel bark and leaves
 Yellow dock root

and raspberry have widely accepted medicinal qualities but are relatively easy to grow as crops so are not likely to become agroforestry alternatives for landowners.

The plants listed below do have commercial potential for wildcrafting as medicinals, pharmaceuticals, or food-related uses, based on those knowledgeable in the field. The life zone, description, history, chemistry, uses, harvesting, reforestation, marketing, and toxicity of most of these botanicals are detailed in *Native Plants of Commercial Importance* (Miller, 1988).

Table 8-1 lists herbs which have some forage potential. Not all of these are usually found in forests, but those that are not may have agroforestry potential in certain locations.

Table 8–1. Botanicals with commercial potential^a

Herb/spice	Part used	Region	Major use in marketing
Angelica (<i>Angelica atropurpurea</i>)	Root	East Coast	Food flavoring and fragrance in cosmetics
Bay (<i>Umbellularia californica</i>)	Leaf	West Coast	Common household spice—perfumes
Bergamot (<i>Monarda fistulosa</i>)	Herb	North America	Cosmetics—flavor additive for fruity citrus
Blackberry (<i>Rubus fruticosus</i>)	Leaf	North America	Food flavoring, tea ingredient
Black cohosh (<i>Cimicifuga racemosa</i>)	Root	East Coast	Pharmaceutical—female disorders (menstrual)
Blessed thistle (<i>Cnicus benedictus</i>)	Herb	North America	Pharmaceutical—increases gastric secretions
Black haw (<i>Viburnum prunifolium</i>)	Bark, stems, root	East, Midwest	Pharmaceutical—antispasmodic, flavoring
Blue cohosh (<i>Caulophyllum thalictroides</i>)	Root	East Coast	Pharmaceutical—female disorders (labor)
Blood root (<i>Sanquinaria canadensis</i>)	Herb, root	East Coast	Pharmaceutical—dental aids; antitumor
Borage (<i>Borago officinalis</i>)	Herb	North America	Pharmaceutical—increases milk in mothers
Burdock (<i>Arctium lappa</i>)	Root	North America	Major produce in Asia—antimicrobial activity
Calamus (<i>Acorus calamus</i>)	Root	North America	Major cosmetic fragrance—mild central nervous system depressant
Cascara Sagrada (<i>Rhamnus purshiana</i>)	Bark	Pacific Coast	Laxative—sunscreen preparations
Catnip (<i>Nepeta cataria</i>)	Herb	North America	Animal toys—tea flavoring—mild sedative
Chapparal (<i>Larrea tridentata</i>)	Herb	Southwest	Pharmaceutical—cancer
Chickweed (<i>Stellaria media</i>)	Herb	North America	Multivitamin additive (iron)—cosmetics
Chicory (<i>Cichorium intybus</i>)	Root	North America	Coffee substitute/additive
Coltsfoot (<i>Petasites fridatus</i>)	Leaf	West Coast	Tobacco substitute/additive
Dandelion (<i>Taraxacum officinale</i>)	Root	North America	Coffee substitute/additive
Devil's club (<i>Oplopanax horridum</i>)	Root	Pacific Coast	Industrial grade panax ginseng
Desert tea (<i>Ephedra nevadensis</i>)	Herb	Southwest	Pharmaceutical—bronchial dilator
Echinacea (<i>Echinacea angustifolia</i>)	Root	North America	Pharmaceutical—blood purifier
Elder (<i>Sambucus nigra</i>)	Flower	North America	Eye and skin lotions—food flavoring
Eucalyptus (<i>Eucalyptus globulus</i>)	Leaf	West Coast	Expectorant and flavoring agent
False hellebore (<i>Veratum viride</i>)	Root	Northwest	Pharmaceutical—hypertension
Ginseng (<i>Panax quinquefolium</i>)	Root	North America	Foods and cosmetics—longevity herb
Goldenseal (<i>Hydrastis canadensis</i>)	Root	East Coast	Pharmaceutical—eyewash, uterine hemorrhage
Horehound (<i>Marrubium vulgare</i>)	Herb	North America	Cold and cough medicines—food flavoring
Horsetail (<i>Equisetum arvense</i>)	Herb	North America	Source for silica—pet food flavoring
Kinikinnick (<i>Arctostaphylos uva-ursi</i>)	Leaf	Mountains	Pharmaceutical—urinary antiseptic
Licorice (<i>Glycyrrhiza glabra</i>)	Root	North America	Food flavoring—cough drops and syrups
Lobelia (<i>Lobelia inflata</i>)	Herb	East Coast	Pharmaceutical—expectorant, central nervous system depressant
Lovage (<i>Levisticum officinale</i>)	Root	North America	Food additive—fragrance (like celery)
Mayapple (<i>Podophyllum peltatum</i>)	Root	East Coast	Pharmaceutical—pain killer (danger)
Marshmallow (<i>Althea officinalis</i>)	Root	North America	Pharmaceutical—mucous inflammation
Mistletoe (<i>Phoradendron flavescens</i>)	Herb	North America	Decorative—pharmaceutical, sedative
Mormon tea (<i>Ephedra nevadensis</i>)	Herb	Southwest	Pharmaceutical—antispasmodic
Mugwort (<i>Artemisia vulgaris</i>)	Herb	North America	Pharmaceutical—bring on menstrual period
Mullein (<i>Verbascum thapsus</i>)	Herb	West Coast	Eardrops, eyewash—bronchitis, asthma
Nettle (<i>Urtica urens</i>)	Herb	North America	Shampoos—food ingredient, tea
Oregon grape (<i>Berberis aquifolium</i>)	Root	West Coast	Chemistry and use similar to goldenseal
Passionflower (<i>Passiflora incarnata</i>)	Herb	East, Midwest	Flavoring, sedative
Pennyroyal (<i>Mentha pulegium</i>)	Herb	North America	Insect repellent—antispasmodic
Pipsissewa (<i>Chimaphila umbellata</i>)	Herb	Northern (high)	Urinary antiseptic—food additive (root beer)
Plantain (<i>Plantago major</i>)	Herb	North America	Antiseptic, eyewash—flea repellent
Poke (<i>Phytolacca americana</i>)	Root	East Coast	Pharmaceutical—skin cancers, rheumatism
Prince's pine (<i>Chimaphila umbellata</i>)	Herb	North America	Food flavoring in root beer

Table 8–1. Botanicals with commercial potential^a—con.

Herb/spice	Part used	Region	Major use in marketing
Queen-of-the-meadow (<i>Eupatorium purpureum</i>)	Herb	East Coast	Pharmaceutical—breaks fever
Rosehip (<i>Rosa canina</i>)	Buds	North America	Vitamin C—bioflavonoid, food flavoring
St. John's wort (<i>Hypericum perforatum</i>)	Herb	North America	Hypericum red dye
Sarsaparilla (<i>Smilax regelii</i>)	Root	Southwest	Food additive (root beer)—rheumatism, tonic
Scullcap (<i>Scutellaria lateriflora</i>)	Herb	North America	Pharmaceutical—nervine, sedative
Shepherd's purse (<i>Capsella bursa-pastoris</i>)	Herb	North America	Pharmaceutical—stop hemorrhaging (birth)
Slippery elm (<i>Ulmus rubra</i>)	Bark	East Coast	Laxative—food flavoring
Tansy (<i>Tanacetum vulgare</i>)	Herb	North America	Insect repellent
Valerian (<i>Valeriana officinalis</i>)	Root	North America	Pharmaceutical—sedative (valium)
Vervain (<i>Verbena hastata</i>)	Leaf	North America	Pharmaceutical—expectorant, tonic
Walnut (<i>Juglans nigra</i>)	Hull	North America	Brown dye
White oak (<i>Quercus alba</i>)	Bark	East Coast	Pharmaceutical—burns and sore mouth
Wild cherry (<i>Prunus serotina</i>)	Bark	East Coast	Pharmaceutical—worms and expectorant
Wild ginger (<i>Asarum canadense</i>)	Root	Northwest	Pharmaceutical—stimulant, carminative
Wild lettuce (<i>Lactuca scariola</i>)	Herb	North America	Pharmaceutical—opiate compounds
Wintergreen (<i>Gaultheria procumbens</i>)	Leaf	East Coast	Methyl salicylate source—food flavoring
Witch hazel (<i>Hamamelis virginiana</i>)	Bark	East Coast	Astringent and hemostatic ointments, washes
Woodruff (<i>Asperula odorata</i>)	Herb	North America	Cosmetic fragrance—food flavoring
Wormwood (<i>Artemisia absinthium</i>)	Leaf	North America	Food additive—pillows (sachet)
Yarrow (<i>Archillea millefolium</i>)	Flower	North America	Cosmetic—food flavoring, teas
Yellow dock (<i>Rumex crispus</i>)	Root	North America	Red dye—skin disorders, iron source
Yerba santa (<i>Eriodictyon californicum</i>)	Leaf	West Coast	Pharmaceutical flavoring—food flavoring

^aMiller (1985).

Market and Competition Considerations

Culinary Uses

It is estimated that the United States presently imports over 10 times the volume of herbs and spices that it exports, primarily because most spices and herbs require special dehydration to control the quality of the volatile oils, and the hand-drying of these crops is very labor-intensive, which gives great advantage to developing countries with very cheap labor. Nonetheless, the market for native American herbs and spices that might be wildcrafted or “forest farmed” appears to be promising. There is presently a large and growing demand from food manufacturers and spice companies for herbs and spices, and these markets should continue to grow for many years.

Direct (retail) marketing and also bulk marketing are discussed in *The Potential of Herbs as a Cash Crop* (Miller, 1985). Direct (retail) options for the wildcrafter or forest farmer include the roadside stand, U-pick operation, roadside market, farmers’ market, “peddling,” gift basket, and mail order. Also covered are direct sale to retailing outlets, local and small specialty manufacturers, and restaurants.

Herbs may have the best potential as cash crops in areas that are not suited to more familiar farm crops. Areas with limited water and relatively poor soil sometimes can produce as much income per acre with herbs as the most fertile areas with abundant water can produce income per acre with traditional farm crops. If leaseholder systems continue to evolve toward forest farming, small acreages of herbs may become a familiar sight in forests.

The market for the harvest and sale of wildcrafted fresh greens is more limited. For one reason, fresh wild greens are delicate, far more so than mushrooms, for example. They crush easily, just by their own weight, and they wilt easily. Just 2 hours in the hot sun will ruin them. One of the larger businesses in the Northwest in wild edibles had only very modest success with wild greens, even when it limited foragers to those plants that were safest to identify, such as miner’s lettuce and sorrel. Plant identification is more difficult than for other edibles (like morel mushrooms, for example). The harvester must have a very good knowledge of botany to be trained to forage for edible greens. Just one error with greens, such as mistakenly getting hemlock leaves into a batch of edible greens, would create enormous difficulty for the entire “wild edibles” industry.

Nevertheless, wild harvested greens can be marketed. For example, a cooperative network of growers and harvesters in Michigan specializes in exotic produce items. Among the wild harvested spring greens and potherbs sold by mail order are miner's lettuce, wild leeks (ramps), fiddleheads, cattail shoots, cattail kittens, and stinging nettles. All of these have potential for commercial cultivation or for management on forest lands as food products. Also marketed by the cooperative network are wild harvested fresh mushrooms and dried mushrooms; dried blueberries, cherries, cranberries, currants, and tomatoes; organic wild rice; and edible flowers, among other items.

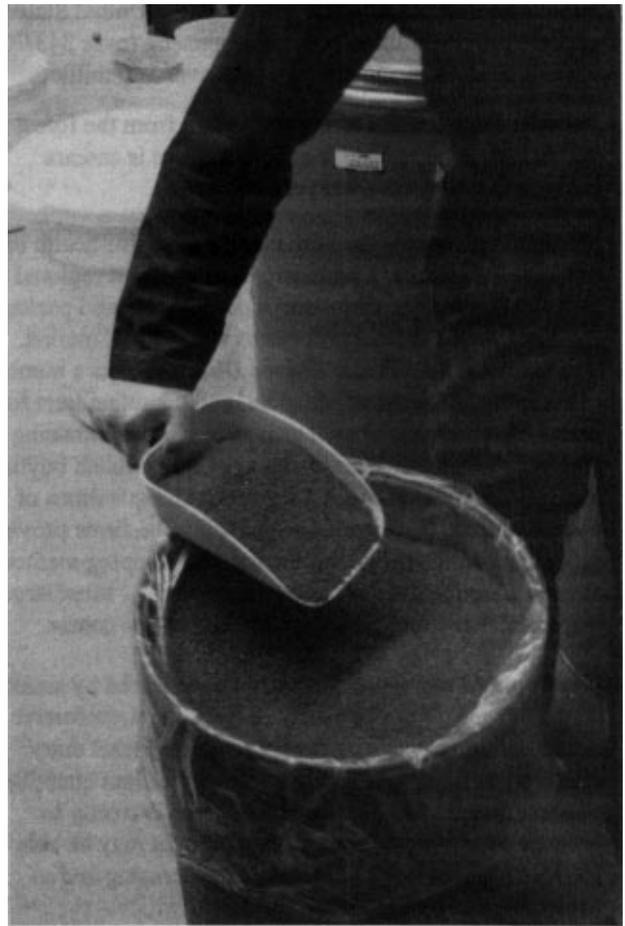
There are two primary markets for fresh products—gourmet restaurants and their associated food service operations, and grocery stores. Grocery stores would be the more dependable market, since restaurants are an “iffy” market and sell wild edibles as a fad or novelty as much as anything else. However, the economy does have a great effect on people's eating habits, and caution is advised in beginning a business related to cooking greens. A major education effort might be necessary as a part of any marketing area. The secondary market is direct mail order to individuals.

Medicinal and Pharmaceutical Uses

The continuing popularity of natural remedies and nutritional supplements and the growing interest in plant-derived chemical compounds for pharmaceuticals are creating important new market opportunities for forest botanicals. Many medicinal plants sold as alternative health care products or nutritional supplements are readily marketable through herb and botanical buyers or, in some cases, directly to the retail market. Furthermore, while sales of medicinal plants to mainstream pharmaceutical firms provide only a limited market presently, one need only consider the phenomenon of the anticancer substance taxol and its source, the Pacific yew tree, to realize how quickly that market can change with the discovery of an important new drug derived from chemical compounds found in plants.

In addition, specialists in native plant marketing emphasize that for almost all pharmaceutical products from botanicals, the European market is about 10 times as large as the U.S. market. For example, the European market for goldenseal and cascara sagrada bark (used for laxatives) is more than 20 times that in the United States.

Ginseng provides perhaps the most familiar example of the potential market for a forest botanical used for medicinal purposes. Ginseng is used as a nutritional supplement and as an ingredient in skin cremes. It is widely believed to improve circulation, increase vitality, and mitigate the effects of aging. Ginseng is widely consumed in oriental countries, and the United States



Bee pollen is being marketed by companies such as Montana Naturals International, Inc., as a preventive medicine and nutritional supplement. Photo courtesy of Montana Naturals International, Inc.



Granulated bee pollen and capsules of bee pollen royal jelly and propolis. Propolis is purported to have antiviral, antibacterial, and antifungal properties. Photo courtesy of Montana Naturals International, Inc. (SFP-1)

exports significant amounts. In 1990, the United States exported over 1 million pounds of ginseng (over 843,700 pounds to Hong Kong alone) worth over \$80 million.

Another example of a major drug plant from the forest that is harvested for major export markets is cascara sagrada bark from the west coast.

Medicinal plants for the herbal and alternative health care markets are marketed primarily through small regional botanical or herb buying houses that process and package the plant parts for final processors or the retail market. The annual *Whole Foods Source Directory* lists a number of different wholesalers, retailers, and manufacturers for each herb and spice as well as sources for warehousing and transportation. These firms typically publish buying and selling catalogs that list the types and quantities of plant materials they purchase and sell. The firms provide guidelines on the proper collection and shipping methods to use. Examples are given in the appendix. Most large buyers of medicinal plants are located on the coasts.

Marketing of medicinal plants is characterized by small start-up firms. The popularity of herbal and alternative health care products makes new product market entry relatively easy. Producers who have sufficient quantities of plant material that has been harvested correctly to produce a consistent, high-quality product may be able to produce a direct retail product with processing and packaging assistance.

Producers marketing medicinal plants need to familiarize themselves thoroughly with Federal and State regulations regarding health care products. In general, if the product is marketed only as a food substance/nutritional supplement, with no medical claims, then the product will not have to undergo the extensive testing and certification required of pharmaceutical drugs.

Pharmaceutical firms that produce prescription and over-the-counter drugs are another market for certain medicinal plants. While many biologically based drugs have been replaced with synthetic drugs, there are still drugs produced from cultivated or wild medicinal plants. For example, reserpine, used to reduce hypertension, is produced from *Rauwolfia serpentina*, and colchicine, which relieves gout, is produced from meadow saffron (*Colchicum autumnale*). Recent discoveries, such as the cancer-fighting potential of taxol, are creating renewed interest in exploring chemical composition of forest plants. However, since pharmaceutical firms seek synthesized compounds if possible (for quality control purposes), the market for medicinal plants used in prescription and over-the-counter drugs is still very small. But if a plant compound cannot be artificially synthesized, then these firms will first seek cultivated plants grown under very uniform growing conditions and then wild plants if they cannot be field-grown.

The *OPD Chemical Buyers Directory* (the “Green Book”) lists sources of supply for biological chemicals and related process materials. The OPD also issues a bimonthly magazine and a weekly paper, the *Chemical Market Reporter*, which contains information on botanicals, companies dealing in these products, price fluctuations, and related information.

The following rules of getting started have been suggested by those most familiar with the marketing of wild harvested botanicals:

1. Don't talk to a buyer until you have something ready to sell. Most people make the mistake of trying to contact a large buyer to try to find out from them if it is worth their while to try to wildcraft a product and sell it. But most buyers are not interested in talking to anyone about that. They are only interested in buying. A broker, however, will work with a small harvester, grade the product, and give advice.
2. Do a feasibility study that will produce a large enough volume of materials to actually sell, such as 2,000 pounds. Any company interested in buying in very small volumes (hundreds of pounds) probably is not a true reflection of the market anyway.
3. Always send samples of your product, and be able to back these up with at least 2,000 pounds of materials to sell.
4. If you are intending to make a career out of specialty forest products, find a buyer in your region and “get in line.” Work at modest levels of production if necessary for several years while moving up the line. Consider these early years as schooling, and any financial setbacks as tuition and book fees. If you break even, consider it a pretty cheap education. If you try to crowd (that is, get to the top of a buyer's list), people who do not like your ethics are going to avoid doing business with you. Greedy people are generally not in the industry longer than about 2 years.
5. Realize you must learn the craft and business slowly and from the ground up. Many people get into trouble trying to hire other people to do the actual harvesting, for example. But this is exactly what the entrepreneur needs to learn first for himself or herself. No one can start out from scratch and expect to immediately become a “wheeler dealer.” Everyone needs to start out at the lowest rungs of the ladder, or they will miss some valuable lessons, and maybe lose the whole ball game.

There are various ways for harvesters to notify wholesalers that they have botanicals available for sale. A bulk sheet mailer is one way, accompanied by a sample. This may lead to a buyer offering to buy the product on the spot, perhaps for a minimum quantity of anywhere between 500 and 5,000 pounds. The 500-pound buyers

are usually the regional wholesalers and cooperatives, including some of the chain food stores, small manufacturers or local marketers, and most buying clubs and cooperatives. The standard method of purchase is either spot buying (on specials) or on contract, whereby the farmer/wildcrafter ships on a monthly or bimonthly basis. The 5,000-pound buyers may also be regional wholesalers, but ones who include processing as part of their services to manufacturers. Large manufacturers may use these wholesalers to process their products for interfacing such things as tea bagging machinery. They most often prefer to buy 5,000- to 10,000-pound quantities on a monthly or bimonthly basis. The import/export houses are the large wholesales houses, often oriented toward trade agreements, and are involved in both the import and export of natural resources. Most are in cities with major ports. A typical wholesale house might buy more than 200 tons of a crop, although it might buy in smaller quantities when opening a new market (Miller, 1985). Ideally, the harvester would also secure a contract harvest for the next year.

Another and somewhat better way to proceed is to work with a broker who will sell the product for a percentage fee. It would be folly for a single wildcrafter to contact a major pharmaceutical company, for example, and inquire as to the market for some botanical if the wildcrafter was only capable of producing one-fiftieth the volume that the company needed. The broker may be able to pull together the needed quantity. Often the broker has the necessary contacts and experience to get the best price for the product and will also arrange to handle billing and collection for 10 percent of gross sales after collections.

The market data that follows (table 8–2) were taken from *Native Plants of Commercial Importance* (Miller, 1988), a publication that also details the life zone, description, harvest methods, reforestation, marketing, and toxicity of each plant. Data reflect 1987 and 1988 estimates where available. This list, presented in Table 8–2, is not meant to be comprehensive but, rather, representative.

New ventures should begin with a feasibility study that is large enough to test the market and develop an accurate cost-of-goods produced figure and determine the viability of the harvesting techniques. This will determine if the market will actually support the time and labor required to find, harvest, and process the materials.

Table 8–2. Sample list of forest botanicals and their markets as medicinals

Botanical (by region)	Estimated domestic market	Wholesale price to harvester (per lb)
Northeast		
Mandrake root	250 tons	\$0.90
Stinging nettle	NA	\$0.45 to \$1.30
Pokeweed	NA	NA
St. John's wort	NA	\$0.60 to \$1.65
Sassafras root bark	Over 400 tons	\$0.35 to \$0.85
Wild cherry bark	NA	\$0.40 to \$1.25 ^a
South		
Black cohosh root	Under 50 tons ^b	\$0.80
Bloodroot ^c	200 tons ^d	NA
Blue cohosh root	Under 30 tons ^b	\$0.70
Ginseng root	NA	NA
Goldenseal root	NA	NA
Passionflower herb	NA	\$0.65
Prince's pine herb	NA	\$1.90
Slippery elm bark	100 tons	\$2.50
White oak bark	200 tons	\$4.35
Wintergreen herb	NA	NA
Midwest		
Black haw bark	NA	\$4.40 ^e
Burdock root	Over 50 tons	0.60
Catnip herb	Over 400 tons	\$0.65 to \$1.30
Coltsfoot herb	Under 40 tons	\$0.40 to \$1.80
Echinacea root	50 tons ^f	\$3.75
Horsetail herb	NA	\$0.35 to \$1.60
Northwest		
Cascara sagrada bark	2,000 tons	\$0.12 to \$1.75 ^f
False hellebore root	NA	\$1.50
Oregon grape root	NA	\$0.85 to \$1.40
Wild ginger root	NA	\$1.40 ^g
Southwest		
Chaparral	200 tons	\$1.00 to \$1.40 ^h
Mormon tea herb	NA	NA
Mullein	Over 400 tons	\$0.35 to \$0.80 ⁱ
Pennyroyal	NA	\$0.48 to \$0.65
Yarrow	NA	NA
Yellow dock root	NA	\$0.15

^aThin bark worth more than thick bark; higher prices for tea bag cuts.

^bSome export opportunity to Germany.

^cHighly toxic.

^dEstimated world market use—2,000 tons.

^eIn powdered form.

^fVaries greatly depending on the age of the bark, its moisture content, the time of the year, and the quantity shipped.

^gDry weight; much of the weight is lost in drying.

^hFor leaf only and less than 10% stem.

ⁱIn baled form; higher price for chipped.

Harvesting, Drying, Storage, Packaging, and Distribution Considerations

Harvesting

It is generally felt that a minimum of a 2- to 4-acre stand of plants is necessary to harvest efficiently. The harvester should be prepared to spend 50 percent of time actually searching for the worthwhile patches. Only minimum harvests of 500 pounds dry weight are regarded as economically feasible.

Wildcrafters should take special care to get permission from landowners prior to any harvesting. To avoid problems (for example, claims of poaching), it is a good idea to also alert local authorities that you are in an area harvesting.

Plants must be harvested from areas that have not been sprayed or otherwise contaminated by road dust, etc.

Perhaps the most underutilized resource is the slash material left by loggers. By following logging crews, one can salvage whole plants, barks, roots, and leaves. By working with logging crews, it is possible to increase the awareness of timber operators of the value of some of the "trash" species, and the salvage work can help clean up a cut area. Loggers can also alert wildcrafters to new areas where the plants being sought grow.

Each product will require different processing and packaging procedures. Communication with a buyer is essential to ensuring that the product is harvested, processed, and packed correctly.

Drying and Storage

Drying is one of the most critical steps in the processing of crude botanicals. Removing moisture not only prevents molding but also inhibits the chemical reactions that otherwise would reduce the plant's end use. Each part of a plant—leaf, herb, root, bark, or flower—must be dried to the correct percentage of moisture required for both storage and transport. The drying process must also be done in such a way as to prevent either the loss of volatile oils (natural flavors) and/or the loss of cosmetic integrity (color or appearance) of the product. This requires close monitoring of both airflow and temperature.

A detailed discussion of airflow, temperature, and vapor pressure considerations in drying herbs and species is contained in Miller (1985). Also discussed are sun-cure and shade-drying methods, a solar drying system, rack drying, a drying shed design, packaging and storage, tags and labels, and trucking. Recommendations are given

for the temperature, method of drying, problems to avoid, storage method, and packaging method for about 100 herbs and spices.

If heat is not available, the crop should be covered with tarps to slow the change in temperature. At the same time, good air circulation is critical during storage to prevent spoilage. Bags will need to be off the floor (for example, on pallets) and away from walls.

All products will lose weight as they lose moisture. Crops stored for longer than 6 months will need to be reweighted before shipping. Harvesters should adhere to good marketing principles and ship a little more product than they bill for.

Distribution

Where processed herbs and spices are concerned, proximity to the market is not as important as with many other commodities. Once dried, botanicals are relatively easy and lightweight to store and transport. The high prices received for them generally make it economical to ship long distances. A 10-ton load of wheat may be worth \$2,000 or less, but a similar load of herbs may be worth \$10,000.

Buyers of medicinal plants are located nationwide, and several new firms and grower cooperatives (primarily for herb production) recently have been established. Shipping can normally be handled by conventional package or contract shippers.

Where fresh greens are wildcrafted, distribution time to local or regional markets must be minimal. Fresh food of any type will probably require special containerized packaging, and delivery time will be critical. While such arrangements are possible, they will be more costly than for dried botanicals and should be justified by the sales.

Depending on the quantities, wild greens may be packaged using any of the usual food container options. Dried greens can be packaged in plastic bags. There are a variety of inexpensive wood and shoo box containers to accommodate the usual "flat" and "basket" quantities. Long-distance shipping may require temperature-controlled containers.

Producers interested in manufacturing a final retail medicinal plant product should identify potential regional retailers. Natural medicinal plant products normally are retailed through health food or natural food stores in metropolitan areas. Drug stores and grocery stores are beginning to stock some medicinal plant products, such as herbal teas, but few are using small, locally produced products yet.

Equipment Needs, Costs, and Suppliers

All forest products that are being collected on a commercial scale from public lands require permits. The permit process typically involves purchasing a local map, obtaining a legal description of the land and the owner(s) (such as a private timber company, national forest, or private individual), obtaining permission from the landowner, and obtaining a permit validation at the sheriff's office. It is important to carry the permit at all times during harvest operations.

Harvesting wild herbs for botanicals calls for hard work, since often the plants are widely scattered over large areas. Large-scale forage operations should be based on an aerial photograph to determine the potential size, quality, and the ease of access to the crop in question. A "motorcycle scout" may do an on-site evaluation. It is also essential to identify a good staging area where the crops will be dried and processed.

Of course, where edible materials are concerned, the single most important requirement is the training given the harvester. In the worst-case scenario, improper plant identification could result in inadvertent poisoning. Equally important is the forager's knowledge of the plants and their habitats. Like all plants, wild greens generally have seasons during which they are at their best for harvesting.

Good training of workers is also needed to ensure appropriate harvesting methods. Harvesting and processing of relatively small areas can usually be achieved by small teams. Most wildcrafters need to make a minimum of \$75 a day to make the work worthwhile. They frequently need to advance money to access remote locations and to obtain the necessary brush permits. Harvesters must often live on forest floors or in other temporary housing.

Basic equipment for foraging would include implements for cutting and digging and containers in which to hold the plants as they are gathered, such as baskets or bags. Harvesters generally carry burlap or woven polypropylene sacks. A wire can be used to hold the sack open, and a shoulder strap will keep the wearer's hands free to work. Most foragers have developed "specialized" tools for particular applications. In general, the equipment is not expensive or difficult to find. It will depend on the species being harvested.

Typically, roots, bark, leaves, or flowers are collected. A variety of hand tools may be used by the harvester, such as shovels, rakes, axes, and chain saws. Bark is removed by hand stripping, using a sharp knife. Roots and rhizomes are dug with a shovel or an asparagus knife.

Light machinery such as a plow, potato digger, or lifter may be used for more deeply rooted plants, and a shrubbery digger can be used on deeply rooted plants. Occasionally, a come-along or gas-powered weed eater equipped with a saw blade may be needed, or even a specialized and prototype piece of light machinery. A small chipper is an important tool for bark and roots to break them into premilling forms and to make the crop easier to dry quickly. Much of this equipment may be available from used farm yard equipment dealers for relatively little money.

Occasionally, renting a piece of commercial equipment may be advised. Industrial-sized vacuums fitted with a rake at the hose end can be used for harvesting flowers. A portable backpack-type vacuum/blower may be used to pull material into bags for drying.

Commercial ventures will usually require a covered, heated building for drying: air, solar, and heat dryers may be needed. Crops that are to be dried in the sun will require tarps. In some cases, a baler and other farm equipment can be used in areas where there is easy access.

A truck with high sidewalls and/or a trailer will be needed to move materials to the staging area. If a purchase order has already been obtained, an operator will want to have a truck waiting at the staging area to receive the bagged or boxed material and ship it directly to a weigh station and on to the buyer. In such cases, a generator will be useful to provide lighting.

A chapter on processing in *The Potential of Herbs as a Cash Crop* (Miller, 1985) discusses in detail milling grades and standards, premilling procedures, types of milling machinery, separation and cleaning processes, and layout considerations for a milling room. Recommended screen sizes and standards for some of the more important herbs and spices are given. A recent paper gives a detailed description of the requirements and costs of a centralized processing facility for botanical cash crops (Miller, 1991). Included in the paper are warehousing, electrical, lighting, milling machinery, sifting machinery, sacking requirements, support equipment, and budget requirements. Sources of used machinery for such an operation are also listed.

Resource Conservation Considerations

For perennials not injured by collection, wildcrafting (picking from the wild population) is sustainable. Rosehips is a good example: locally abundant, the plant is unharmed by the collection of its fruits. But for many other botanicals, sadly, this is not the case. American ginseng, for example, is now threatened, as is lady slipper, the collection of which has been banned by the

American Herbal Products Association and the International Herb Growers and Marketers Association.

Even plants that are easily grown and locally abundant can be so severely overcollected that their populations are not sustainable. Many wildcrafted plants are now becoming harder to find.

Any plan to pursue botanicals on a commercial basis must include a reforestation plan. Each botanical has its own needs for resource protection to ensure that it is not overharvested. The owner or manager of a given area must also be assured that the crop will be regenerated for the future. Many medicinal plants are fragile and some are rare. Some species are also slow growing.

There is also an unfortunate tendency to harvest endangered species of edible plants. Even though it is against the law to pick them, most people do not know what the endangered plants are in a region. If a particular rare plant becomes a "fad," for example, in the time it might take authorities to track down pickers, an entire community of plants could be lost. Hundreds of pounds can be removed in a few hours, roots and all.

Several healthy plants should always be left to spread and continue natural production. Plant physiology departments in local universities may have good suggestions on regeneration of specific species. In addition, recommendations for reforestation of several key commercial forest plants are contained in Miller (1988).

Several national organizations concerned with the conservation of native plants are beginning to take strong positions advocating that large suppliers of plant materials take action to ensure that only propagated and cultivated, not wild-harvested, materials are sold. Groups like the Nature Conservancy are strongly discouraging the buying and selling of wild-harvested native plant materials through the nursery trade. A trend to discourage (and, in fact, to blacklist) firms that sell certain wild-dug or harvested nursery stock has already become clearly established.

There are no doubt dozens of plant species whose commercial wild harvest can be accomplished on a sustainable basis. Most edible greens are cut, not dug up, and there is usually only one cutting per year of an individual plant. Nevertheless, it is reasonable to assume that strong forces will be brought to bear on wild medicinal plant harvesting if the industry does not take strong steps to ensure there is no reduction in the long-term viability of all native plant populations. It would be advisable to begin action on developing cultivated sources of woodland botanicals, perhaps through forest farming or leasing operations.



Nutritional supplements made from bee royal jelly, ginseng, and wild huckleberries. Photo courtesy of Montana Naturals International, Inc. (SFP-2)

Profile

Ron Hague started Montana Naturals International, Inc. nearly 10 years ago in Arlee, Montana. Hague had a strong background in finance and business administration, including international studies. He spent nearly 11 years in the field of public health, including work with the Center for Disease Control in Atlanta and the World Health Organization in Switzerland before returning to the western United States with the intent of starting his own small business. His interest in preventive medicine and self-help health care, combined with a business opportunity in a tiny Montana town of only 80 residents, started him in pharmacognosy and the manufacturing of nutritional supplements.

In the early years, the company (then called Montana Pollen and Herbs) focused on bee products from seven to eight beekeepers, primarily bee pollen and bee propolis. (Bee propolis is a product bees make from the resins of fir and poplar trees. It is believed to have antiviral, antibacterial, and antifungal properties that keep the hive sterile; the bees use it to seal the hive and also to coat any foreign materials which might contaminate the hive.)

After an early success with these bee products, Hague began to look more closely at health issues such as chronic fatigue and stress. An herbalist in Colorado was enlisted to formulate "Pure Energy," a combination of pollen and royal jelly from Northwest beekeeping operations plus an Indian herb called gotu kola and Siberian ginseng. The product provides a stimulant that is an alternative to caffeine.

The company now carries hundreds of inventory items and has been especially successful in export markets. In addition to developing formulas, the company does the drying, sifting, cleaning, milling, tumble mixing, tablet pressing, encapsulation, polishing, and packaging of the products. Today Montana Naturals International, Inc. sells a wide variety of nutritional supplement products through health food stores in all 50 States and 25 foreign countries. They have a staff of about 30 and had sales of about \$3.1 million in 1990. International sales are particularly strong. In 1990, about \$560,000, or 16 percent of total sales, were international. In 1991, this figure is expected to be over \$750,000, and by 1992 the company expects to do over \$1 million in sales to other countries.

Many of the botanicals used are from North America. Among the herbs used are American ginseng (cultivated by Montana growers) and wildcrafted goldenseal. Almost all of the herbs used are purchased from distributors such as Botanicals International, Star West Botanicals, and San Francisco Herbs, companies which, in turn, purchase the products from wildcrafters and growers. (The company found that working directly with wildcrafters was too difficult. Wildcrafters were not sufficiently reliable for the company's needs. Too much contracting time was needed to work with so many independent producers, and Montana lacked a facility for sterilizing the botanicals.)

A relatively new product based on native and wildcrafted goldenseal was developed recently by Montana Naturals for General Nutrition, a large health food manufacturer with about 1,100 stores around the country. Montana Naturals International recently supplied about 12,000 bottles of this supplement to General Nutrition. The company is also considering a long-term project to add a line of Native Indian herbal remedies that would be wildcrafted in forests and plains.

Considerations for a Rural Development Strategy

A great many edible and medicinal plants grow in forested areas of this country, but relatively few have been wildcrafted on a commercial scale. A number of herbs and spices which have good market potential for small farmers should be considered for forest farming ventures.

The key to success in marketing herbs for a rural area will be the development of centralized processing facilities to add value to the products locally. Nearly all botanicals need to be processed to some degree once they are harvested. This may involve washing, drying, grading, sifting, etc. Processing leaves, roots, and bark from a field harvest condition into a usable product for

direct consumption (as foods or medicinals) or further manufacture (by pharmaceutical companies, for example) is critical to a successful venture in these products.

A processing facility located at a centralized point of collection would be important to a rural region pursuing this category of special forest products. Processing bulk botanicals increases both market options and profit margins. More wholesale buyers in the United States would purchase domestically produced botanicals if they could, and many retail stores would buy products from a centralized processing facility. In addition, such a facility could provide a centralized point of marketing for local and regional farm and forage crops. It could also provide an educational center for the region by directing farm, forest farming, and wildcrafting activities.

Harvesting cooperatives, organized in the manner of the old farmers' Grange halls, are one possible strategy for pursuing forest medicinals as an economic venture.

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Organizations

Agricultural Marketing Service (AMS). Contact: W. H. Crocker, Room 2503–S, AMS, USDA, Washington, DC 20250. The AMS fruit and vegetable division Market News Branch provides information on nationwide terminal markets. Many of these larger markets offer up-to-date reports on fresh cut herb prices and shipment sizes. The markets list herbs as well as oriental vegetables and other specialty produce. Herbs are regularly listed at the New York, Boston, Miami, San Francisco, and Los Angeles terminal markets, but 15 other AMS reporting centers also list herbs. These are Atlanta, Baltimore, Buffalo, Chicago, Cincinnati, Columbia (SC), Dallas, Denver, Detroit, Honolulu, New Orleans, Philadelphia, Pittsburgh, Seattle, and St. Louis.

American Herb Association, P.O. Box 1673, Nevada City, CA 95959. This educational association promotes public education about herbs and herbal products, offers quarterly newsletter and source directories. Contact for current information. Individual membership \$20/year, USA; \$28/year, foreign.

American Herbal Products Association (AHPA), P.O. Box 2410, Austin, TX 78768. 512-320-8555. This was once strictly an herbal products manufacturers' trade group, but recently they have broadened their membership to include retailers of herbal products. This organization offers up-to-date information on the Food and Drug Administration (FDA) and other legal and regulatory issues affecting the herbal products sector of the industry. In addition, they offer advertising opportunities, a newsletter, monographs of various herbs, a membership directory, and good public relations. Contact for membership information. This organization would be an excellent information source for both manufacturers and retailers of herbal products.

The Ginseng Research Institute of America, 500 Third Street, Suite 208–2, Wausau, WI 54401. 715–845–7300.

Herb Research Foundation (HRF), 1007 Pearl Street, Suite 200, Boulder, CO 80302. 303–449–2265. This independent, nonprofit educational and research organization is dedicated to raising funds for research

and providing reliable scientific data for members, the public, and the media. It encourages research on common botanicals, folk medicines, and other herbal products. Its aim is to foster ties between the American herbal community and the world scientific community. Members may access in-depth information on herbs through HRF's inexpensive literature searches. Members also receive *HerbalGram*, the well-known quarterly that presents research reviews from the scientific literature, follows legal issues, market trends, and media coverage of herbs. This is a fine publication, a must for those with an interest in botanical medicine or research.

The International Herb Growers and Marketers Association (IHGMA), 1202 Allanson Road, Mundelein, IL 60060. 708–566–4566. This large trade organization offers membership to growers, retailers, wildcrafters, wholesalers, researchers, and extension service personnel. Offers members a bimonthly newsletter containing trade news, marketing and growing hints, technical information, and more. Membership Directory, special seminars and workshops, discounts on conference fees and trade show booth are all benefits. Excellent information source for products, suppliers, etc.

The Lloyd Library, 917 Plum Street, Cincinnati, OH 45202. 513–721–3707. This private library was founded in 1864 by John Uri Lloyd and his brothers. All were pharmacists with a deep interest in botanical medicine. Today this remarkable library contains 180,000 books and 120,000 pamphlets, many of them exceedingly rare. According to UNESCO, the library contains the world's largest collection of pharmacopoeias. They carry many hard-to-find (and extremely expensive) foreign and domestic scientific and technical journals. This is the largest botanical library in the United States. It is open to the public free of charge 8:30 a.m. to 4:00 p.m., Monday through Friday.

National Agricultural Library, USDA Reference Section, Room 111, Beltsville, MD 20705. 301–344–4479. Quick bibliographies (QB) are available on a wide variety of herbal topics including botanical medicine, herb growing, marketing, etc. These searches cover primarily current listings and are abstracted from the USDA's on-line data base, AGRICOLA, one of the world's most extensive agricultural data bases. While not absolutely exhaustive, these bibliographies are very extensive and are of value to anyone seeking current literature on herbal topics. Send a return mailing label for each QB selected. Document delivery services are also available at very reasonable prices. Contact for complete information on services/searches.

National Appropriate Technology Assistance Service,
P.O. Box 2525, Butte, MT 59702. 1-800-428-2525.

National College of Naturopathic Medicine, 11231
Southeast Market Street, Portland, OR 97215. 503-
255-4860.

National Wild Foods Association, 3404 Hemlock
Avenue, Parkersburg, WV 26104. Contact Edlene
Wood, 304-428-9590. Offers information on
preparation and lore of wild foods in all 50 States.

Office of Small-Scale Agriculture, Cooperative State
Research Service/USDA, Washington, DC 20250-
2200. Contact: H. W. Kerr Jr., Director. This office
provides information to small-scale and specialty
agricultural producers. Herbs are definitely included.
Offers a good handout sheet listing numerous sources
and resources for the grower and marketer. Excellent
source.

Produce Marketing Association (PMA), 1500 Casho Mill
Road, Newark, DE 19714-6038. 302-738-7100.
Can provide herb market bibliographies to nonmem-
bers for a \$20 search fee plus \$10 for printouts up to
10 pages, and \$1/page for additional pages. Contact
for details.

The Society for Economic Botany, P.O. Box 368,
Lawrence, KS 66044. International,
multidisciplinary, scientific society that fosters
research on economically useful plants of the past,
present, and future including, of course, herbs.
Members receive quarterly journal, *Economic Botany*.
Individual membership, \$30.

Wilderness Leadership International, Outdoor Eduquip,
Box 770, North Fork, CA 93643 (advertises first
correspondence course in edible wild plants).

Publications

Alternative Agriculture News, 9200 Edmonston Road,
Suite 117, Greenbelt, MD 20770. 301-441-8777.
Published by the Institute for Alternative Agriculture,
this monthly newsletter offers news and resources for
those who are interested in organic production,
sustainable agriculture, etc. Membership, \$15/year.
Recommended for organic growers.

American Ginseng Trends published by Future Concepts,
Inc., P.O. Box 1982, Wausau, WI 54402-1982.

Botanical Series is a series of booklets on plants pub-
lished by the American Botanical Council and
available (\$1.25 per copy) from Steven Foster, P.O.
Box 106, Eureka Springs, AR 72632.

The Business of Herbs, Route 2, Box 246, Shevlin, MN
56676. 218-657-2478. Contact: Paula or David
Oliver. Bimonthly journal featuring interviews,
marketing hints, industry news, new products, ideas,
plant profiles, business tips, sources and resources for
growers, retailers, wholesalers, wildcrafters, educa-
tors, researchers, artists, and designers. Ornamentals,
culinaries, fragrances, medicinals, and other botanicals
featured. \$20/year, USA; \$23, Canada; foreign, \$28
(please remit in U.S. funds).

*Direct-Marketing Registry: Ethical Wildcrafters &
Organic Growers of Medicinal Herbs*. Available for
\$6 from the Rocky Mountain Herbalist Coalition, 412
Boulder Street—Gold Hill, Boulder, CO 80302. 303-
442-2215. Highly recommended.

Foster's Botanical and Herb Reviews, P.O. Box 106,
Eureka Springs, AR 72632. 501-253-7309. Contact:
Steven Foster. This quarterly reviews books, periodi-
cals, and computer resources, both technical and
popular. Reviews cover economic botany, ethno-
botany, taxonomy, herb use, cultivation, etc. Of great
interest to those with a scientific or commercial
interest in herbs. \$10/year.

Greenhouse Grower, 37841 Euclid Avenue, Willoughby,
OH 44094. 216-492-2000. Horticultural trade
magazine for greenhouse growers. Covers bedding
plants, vegetables, ornamentals, specialty crops, etc.
\$12/year.

Grower Talks, P.O. Box 532, Geneva, IL 60134. 312-
208-9080. Editor: G. V. Ball. Monthly trade journal
for the bedding plant industry. Covers new products,
new plants (ornamentals), industry notes, greenhouse
production. \$19/year, USA; \$25/year, Canada.

The Herb Companion, Interweave Press, 201 East Fourth
Street, Loveland, CO 80537. 303-669-7672. Editor:
Linda Ligon. Full-color bimonthly magazine for herb
enthusiasts. Covers all aspects of the herbal arts:
gardening, cooking, crafting, and more. Excellent
new magazine. \$21/year, U.S.; \$26, Canada.

The Herb Market Report, 1305 Vista Drive, Grants Pass,
OR 97527. Editor: Richard Miller. Monthly news-
letter for herb growers and wildcrafters. Marketing
hints, crop profiles, resource reviews. \$12/year. Fine
resource.

The Herb Quarterly, P.O. Box 548, Boiling Springs, PA
17007. 717-245-2764. Editor: Linda Sparrowe.
One of the oldest general interest herb publications in
the United States. Covers all aspects of the herbal
arts. Beautifully illustrated, highly artistic. Recom-
mended. \$24/year, \$45/2 years.

The Herb, Spice, and Medicinal Plant Digest. Contact: L. E. Craker, Department of Plant and Soil Sciences, Stockbridge Hall, University of Massachusetts, Amherst, MA 01003. Quarterly publication with a scientific focus, covering research news, business notes, and other materials of interest to commercial herb producers and researchers. Also available from HSMPD is the very useful *Directory of Specialists in Herbs, Spices, and Medicinal Plants*. This directory lists university, extension service, and industry personnel who are specialists or researchers in various herb-related endeavors. Second edition, May 1989. Price: \$6.

The Herbal Connection and *The Herbal Green Pages*, The Herbal Connection, 3343 Nolt Road, Lancaster, PA 17601–1507. 717–898–3017. *The Herbal Connection* is a bimonthly newsletter, available for \$24 a year. *The Herbal Green Pages* (\$15) is an annual herbal business and resource guide that includes 2,000 listings, both wholesale and retail.

HerbalGram, P.O. Box 12602, Austin, TX 78711. 512–331–8868. Editor: Mark Blumenthal. Although the *HerbalGram* quarterly is the official publication of the HRF, it is now published jointly by The American Botanical Council, a nonprofit educational organization dedicated to informing the public more fully about herbs and botanical products. Subscriptions to *HerbalGram* can be made independently. \$25/year, \$45/2 years.

The Herban Journal, 2346 Charlack Avenue, Overland, MO 63114. Editor: Gayle Brown. Bimonthly newsletter for herb enthusiasts covering crafting, growing, herbal products, and more. \$10/year.

Herban Lifestyles, 84 Carpenter Road, New Hartford, CT 06057. Editor: Chris Utterback. Bimonthly newsletter. Covers all aspects of the herbal arts. Unique, artistic, interesting! \$18/year, U.S.; \$21, Canada; sample, \$3 (U.S.).

Herbs!, Clearwater Communications, P.O. Box 3524, Spokane, WA 99220–3524. 509–535–1158. Full-color bimonthly magazine with a focus on medicinal herbs, herbal products, and herbology. The publication is designed for both the trade and the general reader with a serious interest in medicinal plants. Well-known writers and in-depth information. \$12/year, add \$5 for foreign subscriptions.

Hortideas, Route 1, Box 302, Gravel Switch, KY 40328. Editors: Pat and Greg Williams. Monthly periodical offers a roundup of horticultural news, research notes, technical, and general information. Covers all aspects of horticulture. Many items to interest the herb grower. \$15/year, U.S.; \$17.50/year, Canada.

The Magick Garden, 6303 Creamery Road, McFarland, WI 53558. Editor: Linda Gannon. Bimonthly journal of herbal art and folklore. A must for lovers of ancient herblore. \$12/year. Sample, \$2.

New Farm, The Magazine of Regenerative Agriculture, 222 Main Street, Emmaus, PA 18098. 215–967–5171. Editor: George Devault. Published seven times per year. Covers organic and alternative agricultural topics. \$15/year, U.S.; \$19/year, Canada.

OPD Chemical Buyers Directory is produced by Schnell Publishing Company, Inc., 80 Broad Street, New York, NY 10004–2203. 212–248–4177.

Sage Advice, The Cottage Press, Box 626, Trumansburg, NY 14896. Quarterly newsletter dedicated to herbal arts and crafts. \$10.50/year.

Smith's Natural News, P.O. Box 9038, Denver, CO 80209. Editor: Ellen Smith. Quarterly newsletter dealing with herbs, nature, ecology, natural healing, and living. \$8/year.

Whole Foods, 195 Main Street, Metuchen, NJ 08840–2737. 201–494–2889. Editor: Daniel McSweeney. Monthly trade magazine focusing on the needs of natural foods retailers. Lots of interesting information for sellers of herbal health and cosmetic products. Also publishes the annual *Source Directory* that includes suppliers, manufacturers, wholesalers, brokers, and publishers. An excellent resource. \$30/year.

Additional Resource Persons

Robert Beyfuss, Cooperative Extension, Greene County, Mountain Avenue, HCR 3, Box 906, Cairo, NY 12413–9503. 518–622–9820.

Mike Birmingham, NYS/DEC, 50 Wolf Road, Albany, NY 12233–4253. 518–457–7370.

Anthony G. Hankins, Extension Specialist, Virginia Cooperative Extension Service, Virginia State University, Box 540, Petersburg, VA 23803. 804–524–5962.

T. R. Konsler, Department of Horticultural Science, North Carolina State University, Raleigh, NC 28732; or Mountain Horticultural Crops Research and Extension Center, 2016 Fanning Bridge Road, Fletcher, NC 28732–9216.

Mary Peddie, Rutlands of Kentucky, Box 182, Jail Street, Washington, KY 41096. 606–759–7815.

Dr. C. Richard Roberts, Department of Horticulture/Landscape Architecture, University of Kentucky, Lexington, KY 40546-0091. 606–257–3374.

Phyllis Shaudys, Pine Row Publications, Box 428,
Washington Crossing, PA 18977. 215-493-4259.

Robert Wilson, Technical Specialist, Appropriate
Technology Transfer for Rural Areas, P.O. Box 3657,
Fayetteville, AR 72702. 501-442-9824, 1-800-346-
9140.

Videos

Edible and Medicinal Herbs by Dr. Sharol Tilgner. Wise
Woman Herbals, P.O. Box 328, Gladstone, OR
97027, 503-239-6573.

Edible Wild Plants by Jim Meuninck and Jim Duke with
practical tips of foraging and preparation of 100 wild
edible plants, medicinal herbs, and wildflowers.
Media Methods, 24097 North Shore Drive,
Edwardsburg, MI 49112. 616-699-7061. \$18.95

Herb Publications of Regional Interest

The Herbal Gazette, Route 1, Box 105, Checotah, OK
74426. Editors: Betty Wold and Barbara Downs.
This quarterly is for herb growers in the south central
region (Arkansas, Missouri, Kansas, Texas). Covers
all aspects of herb growing, marketing, and use with a
regional focus. \$7.50/year.

Ozark Resource Center, HC 3, Brixey, MO 65618. Has
information on the biodiversity of the Ozarks region.

Elizir Farm Botanicals, General Delivery, Brixey, MO
65618. 417-261-2393. Specializes in seeds of Ozark
native plants and Chinese medicinal plants.

Windy Pines Natural Farm, Route 1, Box 245, Dix, IL
62830. 618-266-7351. Specializes in native medici-
nal plants of southern Illinois.

Foster's Botanical & Herb Review, P.O. Box 106,
Eureka Springs, AR 72632. 501-253-7309.

Wholesale Buyers of Botanical Products

The following buyers are listed in *Native Plants of
Commercial Importance*, Richard Alan Miller, 1988,
Grants Pass, Oregon: OAK, Inc.

American Mercantile Corporation, Inc., P.O. Box
240654, South Bend, IN 38124.

Aphrodisia Products, Inc., 45 Washington Street,
Brooklyn, NY 11201

Bee Creek Botanicals, P.O. Box 12006, Austin, TX
78711.

Bernard Associates, Inc., 2596 Bay Road, Redwood City,
CA 94063.

Bio Botanica, Inc., 75 Commerce Drive, Hauppauge, NY
11787.

Botanicals International, Inc., 2550 El Presidio Street,
Long Beach, CA 90810.

E. L. Scott & Company, One World Trade Center, Suite
2347, New York, NY 10048.

Fmali Company, 831 Almar Avenue, Santa Cruz, CA
95060.

Folexco Inc., 25 Davis Street, South Plainfield, NJ
07080.

Frontier Herb Cooperative, Box 299, Norway, IA 52318.
319-227-7991.

Golden Bough Herbs Ltd., 103-326 East Kent Avenue,
South Vancouver, BC V5X 4N6 CANADA.

Great Northern Botanicals Association, P.O. Box 362,
Helena, MT 59624. 406-442-1623.

Herbarium, Inc., 11016 152nd Avenue, Kenosha, WI
53140. 414-857-2373.

KHL Flavors, Inc., 3702 48th Street, Long Island City,
NY 11104.

The Lebermuth Company, P.O. Box 4103, South Bend,
IN 46624.

Louis Furth, Inc., 52-15 Flushing Avenue, Maspeth, NY
11378.

Ludwig Mueller Company, Inc., Two Park Avenue, New
York, NY 10016.

Meer Corporation, 9500 Railroad Avenue, North Bergen,
NJ 07047.

M. F. Neal & Company, 1900 East Franklin, Richmond,
VA 23201.

Meridian Trading Company, 1245 Pearl Street, Suite
210, Boulder, CO 80302.

Nature's Sunshine Products, P.O. Box 1000, Spanish
Fork, UT 84660.

Nature's Way, 10 Mountain Springs Parkway,
Springville, UT 84663.

North American Spice & Herb Company, 250 West First,
Suite 201, North Vancouver, BC V7M 1B4,
CANADA.

Northwest Botanicals, Inc., 1305 Vista Drive, Grants Pass, OR 97527.

San Francisco Herb & Natural Food, P.O. Box 40604, Emeryville, CA 94140.

San Francisco Herb Company, 240 14th Street, San Francisco, CA 94103.

Schonfield & Sons Inc., 12 White Street, New York, NY 10013.

Starwest Botanicals, Inc., 11253 Trade Center Drive, Rancho Cordova, CA 95670.

Trout Lake Farm, 149 Little Mountain Road, Trout Lake, WA 98650. 509-395-2025.

Turtle Island Herbs Inc., Gold Hill—Saline Star Route, Boulder, CO 80302. 303-442-2215.

The Whole Herb Company, 250 East Blithedale, Mill Valley, CA 94941.

Wilcox Natural Products, Inc., 123 West Howard Street, Boone, NC 28607.

Large Buyers of Botanicals and Extracts

The following companies are listed in the 1991 *OPD Chemical Buyers Directory* (Schnell Publishing Company Inc., 80 Broad Street, New York, NY 10004-2203, 212-248-4177) as selling one or more of the following: botanicals and extracts, cosmetic botanicals, herbs and spices, homeopathic extracts and tinctures, flavors and enhancers, gums and stabilizers, oleoresins, oils, and pharmaceuticals:

Active Organics, Inc., 6849 Hayvenhurst Avenue, Van Nuys, CA 91406. 818-786-3310, fax 818-786-3313.

Ampak Company, Inc., 481 Main Street, Suite 502, New Rochelle, NY 10801. 914-633-9800, fax 914-633-9804.

Andard-Mount (London) Ltd., West Africa House, Ashbourne Road, London, England W5 3PQ. 01-991-5150, fax 081-991-5001.

William Bernstein Company, Inc., 15 Park Row, New York, NY 10038. 212-233-5922, fax 212-233-5925.

Bio-Botanica, Inc., 75 Commerce Drive, Hauppauge, NY 11788. 516-231-5522 or 1-800-645-5720, fax 516-231-7332.

Botanicals International, Inc., Division of Zuellig Botanicals Inc., 2550 El Presidio Street, Long Beach, CA 90810. 213-637-9566, fax 213-637-3644.

Chart Corporation, 787 East 27th Street, Paterson, NJ 07504. 201-345-5554.

The Fanning Corporation, 1775 West Diversey Parkway, Chicago, IL 60614. 312-248-5700, fax 312-248-6810.

Folexco, Inc., 25 Davis Street, South Plainfield, NJ 07080. 201-769-8400, fax 201-769-8404.

Freeman Industries, Inc., 100 Marbledale Road, P.O. Box 415, Tuckahoe, NY 10707-0415. 914-961-2100, fax 914-961-5793.

Hauser Chemical Research, Inc., 4750 Nautilus Court, Boulder, CO 80301. 303-530-4750, fax 303-530-7083.

Herbarium, Inc., 11016-152nd Avenue, Kenosha, WI 53142. 414-857-2373, fax 414-857-9501.

International Sourcing, Inc., 121 Pleasant Avenue, Upper Saddle River, NJ 07458. 201-934-900, fax 201-934-8291.

Koster Keunen, Inc., Bourne Boulevard, P.O. Box 447, Sayville, NY 11782. 516-589-0456, fax 516-589-0120.

Lebermuth Company, Inc., P.O. Box 4103, South Bend, IN 46624. 219-259-7000 or 1-800-648-1123 Ext. 222, fax 219-258-7450.

Meer Corporation, 9500 Railroad Avenue, North Bergen, NJ 07047. 201-861-9500, fax 201-861-9267.

Particle Dynamics, Inc., 2601 South Hanley Road, St. Louis, MO 63144. 314-968-2376, fax 314-968-5208.

Penta Manufacturing, P.O. Box 1448, Fairfield, NJ 07007. 201-575-747, fax 201-575-8907, Santell Chemical Company.

E. L. Scott & Company, Inc., 1 World Trade Center, Suite 1313, New York, NY 10048. 212-432-0100, fax 212-432-7700.

Strahl & Pitsch, Inc., 2230 Great East Neck Road, West Babylon, NY 11704. 516-587-9000, fax 516-587-9120.

F. H. Taussig, Inc., 111 Brook Street, Scarsdale, NY 10583-5192. 914-472-6464, fax 914-472-1846.

Tri-K Industries, Inc., 27 Bland Street, Emerson, NJ 07630. 201-261-2800, fax 201-261-1432.

Weinstein Chemicals, Inc., 666 Baker Street, Suite 331, Costa Mesa, CA 92626. 714-754-0901, fax 714-754-0936.

Whole Herb Company, Inc., P.O. Box 1085, Mill Valley, CA 94942-1085. 415-383-6485, fax 415-381-1747.

Wilcox Natural Products, P.O. Box 391, Boone, NC 28607. 704-264-3615, fax 704-264-2831.