Dietary Supplements: The New Herbalism

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Summary. The passage of the Dietary Supplement Health and Education Act in 1994 made the use of supplements more acceptable in the U.S., increasing demand for botanicals to use in health care and maintenance. These botanicals, primarily medicinal and aromatic plants, currently represent about 25% of the dietary supplement market in the U.S. Although much of the market for botanicals traditionally has been met through collection of plants in the wild, enhanced cultivation of several species will be essential to bring standardized, quality plant materials into the marketplace.

The use of botanical and mineral supplements for health care dates back to the beginning of human history. With the advent of pharmaceutical remedies in the last century, however, use of many of these dietary supplements fell from favor in the United States and other westernized countries. Only with the passage of the Dietary Supplement Health and Education Act (DSHEA) in 1994 (U.S. Congress, 1994), did these products become legitimized, increasing consumer confidence in the supplements and launching a repopularization of these health aids. The DSHEA legislation permits herbs, vitamins, and other supplements to be marketed and sold as dietary supplements rather than drugs, eliminating the costly and time consuming U.S. Food and Drug Administration drug approval process, yet also strictly regulates labeling of supplements to prevent misleading marketing. Following the passage of DSHEA, sales of dietary supplements markedly increased, most notably between 1997 and 1999, with over 70% of the U.S. households using supplements by 1999 (Gottieb et al., 1999).

Although the rapid growth in the supplement market has recently slowed, causing a slight decrease in sales during 2000 (Taormina, 2001), interest in supplements remains high. In 2000, supplement sales exceeded $16.8 billion with three of every five U.S. consumers taking supplements on a regular basis (Dietary Supplement Education Alliance, 2002). Most consumers probably began purchasing dietary supplements to maintain optimum health, slow the aging process, meet nutritional needs, or improve physical performance, but dietary supplements, particularly the botanicals, have become widely used as health remedies (Israelsen, 1998).

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The market for herbal remedies (botanicals) as dietary supplements includes both prescription and over-the-counter sales with applications in the food, healthcare, cosmetic, and veterinary industry. In 2000, consumer sales of dietary supplements made from botanicals was more than $4 billion (Blumenthal, 2001), representing 25% of the dietary supplement market (Dietary Supplement Education Alliance, 2002). The potential U.S. market for botanicals as dietary supplements has been estimated at $25.8 billion (Hoffman, 2001).

Markets

Herbal remedies have a long, historical association with the human need for health and the quest for youth and beauty. Ancient texts and scriptures linked with centers of early civilizations indicate that medicinal and aromatic plants frequently served as the principal constituents for embellishing the body and curing ailments (Hobbs, 2002). Casual observations today suggest that grocery stores, pharmacies, and convenience stores are devoting considerable more shelf space to herbal medicines than at any time in the recent past. U.S. markets for botanicals as dietary supplements are expected to increase at about 8% per year (Gruenwald, 2000). Recent reports in *Time* (Greenfield, 1998; Greenwald, 1998) magazine indicate that in the U.S., the market for herb-spiked drinks has moved from $20 million to $700 million in 4 years. A report in *Whole Foods* (Richman and Witowski, 2000) magazine indicated that in U.S. health food stores, 36% of the foods contained medicinal or aromatic plant materials.

An array of old and newly recognized medicinal and aromatic plants, essential oils, and botanical extracts have gained prominence in natural product markets, fueled by changes in demographics and personal choices about self-care (Table 1). An informal survey of customers at a local health food store (Hadley, Mass.) conducted in Spring 2001, suggested that consumers desire products that improve health, contain natural ingredients, are environmentally sound, preserve social and cultural values, are unadulterated, and satisfy the consumer need to feel good about purchasing the product. Each consumer also mentioned the health aspects associated with natural products and the availability of medicinal and aromatic plants for health maintenance. Sales of many botanicals as dietary supplements are, to a large extent, driven by the news media. Following several popular media feature stories on herbs in 1997, sales of a number of herbal remedies dramatically increased (Table 2). But likewise, a report in the *Journal of the American Medical Association* (Hypericum Depression Trial Study Group, 2002), indicating that st. john's wort (*Hypericum perforatum*) had no effect on severe depression, was featured without comment by almost every large and small newspaper in America, leading many customers away from an herb that is generally considered useful for treatment of mild or moderate depression.

In addition to media attention, several other factors, including changing attitudes on healthcare and shifting demographics, are affecting the sales and use of dietary supplements. Societal recognition of the shortcomings of pharmaceutical medicine, a desire for more holistically-based healthcare, and consumer self-care empowerment are responsible for much of the growth of the supplement industry (Dietary Supplement Education Alliance, 2002). Demographically, an aging population is influencing supplement use (Table 3). Each minute from now until 2010, seven Americans will turn 55 years old, and currently about 35 million Americans are age 65 years or older (U.S. Census Bureau, 2001). Sales of soy (*Glycine max*) and black cohosh [*Cimicifuga racemosa* (syn. *Actaea racemosa*)] products have jumped in the past 2 years as more women enter menopause and seek natural supplements to ease the associated symptoms. Sales of flax (*Linum usitatissimum*) and evening primrose (*Oenothera biennis*) oils have increased as people have become familiar with the medical benefits of omega-3 fatty acids and g-linolenic acid in the plant tissues (Simopoulos, 1999).

Many recent scientific studies support the use of dietary supplements in healthcare. For example, in 1999, a new class of pharmaceutical drugs, the cyclooxygenase-2 (COX-2) inhibitors, became available. The COX-2 drugs block an enzyme responsible for the pain and inflammation of arthritis and may prove to be key cancer preventative drugs. Several medical studies on herbs such as ginger (*Zingiber officinale*), turmeric (*Curcuma longa*), green tea (*Camellia sinensis*), and holy basil (*Ocimum sanctum*), have demonstrated that these herbs also have significant COX-2 inhibitory action and lack the side effects of the pharmaceutical versions (Babal, 2001; Haqqi et al. 1999; Suh et al. 1998).

To be accepted as legitimate pharmaceuticals, however, herbal medicinals must pass expected market standards for identity, quality, and bioactivity. As noted by a recent evaluation of 25 commercial echinacea

Table 1. Demographics of herbal supplement users (data of Molyneaux, 2002).

Age	About 60% are ≥46 years old
Education	Mostly college educated and many with post graduate degrees
Lifestage	Older, 55% represent single, retired couples, and parents
Household	Limited, 60% live in one or two-person homes
Income	Slightly higher than average
Health	Self-care seekers, practice prevention
Supplement	Regular use of herbal supplements by 16%

Table 2. Sales of medicinal herbal products in the U.S., June 1997 to June 1998 (Data of Brevoort, 1998).

Medicinal herb	Sales increase (%)
St. John's wort (*Hypericum perforatum*)	2,801
Green tea (*Camellia sinensis*)	1,007
Black cohosh (*Cimicifuga racemosa)*	511
Elderberry (*Sambucus nigra*)	497
Kava (*Piper methysticum*)	473
Soy (*Glycine max*)	163
Echinacea (*Echinacea* spp.)	151

Table 3. U.S. population and potential markets by generation (Data from U.S. Census Bureau, 1996).

Market classification	Size (millions)
Swing/WWII (1933–45)	30.7
Baby Boomers (1946–64)	76.8
Generation X (1965–78)	52.4
Baby Boomlet (1979–94)	77.6

(*Echinacea* spp.) products in which 44% failed a test that examined product labeling and plant materials (Natural Products Industry Insider, 2001), not all products are satisfactory. Although some dietary supplement companies are attempting to standardize the activity of herbal medicines, such attempts depend on knowing the active plant constituents and having appropriate testing equipment. If products can be standardized at active levels of the active constituent(s), sales of these supplements can be expected to continue to increase (Table 4).

Plant materials

With market demand for medicinal and aromatic plant products strong and expected to remain strong, work in herb production, protection/conservation, domestication, genetic transformation, and constituent standardization is needed (Craker, 2003). To effectively cultivate medicinal and aromatic plants that have been traditionally collected, information is needed on plant life cycles, breeding behavior, seed biology, and a host of other plant variables. Investigations are needed on plant growth and development, population and habitat viability, post harvest handling, and methods for producing crops with consistent levels of biologically active constituents. Cultivar, nutrition, and pest control trials are needed for cultivated medicinal species.

More needs to be learned about producing medicinal and aromatic plants, utilizing organic farming methods, and the processing of the plant material with practices that preserve bioactive constituents. All of this information is needed for a multitude of medicinal herbs grown in a range of light, temperature, moisture, and soil environments (Craker, 1999).

In medicinal and aromatic plant production, the ground-work has been laid with the development of good agricultural practices (GAPs), good manufacturing practices (GMPs), and good collecting practices (GCPs) (Máthé and Franz, 1999; Harnischfeger, 2000), guidelines for bringing quality medicinal plant materials to the market. The Medicinal and Aromatic Plant Section within the International Society for Horticultural Science vigorously supports the guidelines that ensure that international trade in medicinal plants meets acceptable standards for value (Bernáth et al., 1993). Following the guidelines, each grower and plant collector helps ensure that wholesome medicinal and aromatic plants reach markets.

In addition to developing agricultural techniques, plant conservation issues must be addressed. Much of the demand for medicinal plant materials is currently being met by harvest of wild plants. About 90% of the medicinal plant materials used by Europeans, for example, are wildcrafted (Lange, 1998). In the U.S., officials at the Great Smoky Mountains National Park estimate that over $5 million dollars worth of american ginseng (*Panax quinquefolius*) has been illegally harvested on park land in the last 9 years (Nickens, 2001). Rangers in national forests of North Carolina have witnessed a decline in ginseng density from 29.8 plants per plot in 1979, to 5.7 plants per plot in 1999 (U.S. Fish and Wildlife Service, 2001).

Gathering firm evidence on medicinal plant production in the North America is difficult due to a lack of government tracking for most species. Estimates suggest, however, that 175 native North American species of medicinal plants (cultivated and collected) are offered for sale in the non-prescription medicinal market of the United States (Lyke, 2000). Robbins (1999) has documented that over 140 North American species are sold in foreign countries. This large number of medicinal species with a variety of environmental habitats, physiological processes, active constituents, and markets limits the development of general horticultural recommendations related to cultivation and collection, but highlights opportunities for growers of medicinal plants.

Table 4. Value of U.S. botanical markets ($ millions) (Data of Brookman, 1999).

Item	1993	1998	2003
Plant chemicals	1185	1890	2935
Essential oils	465	625	820
Botanical extracts	268	560	1120
Gums, gels, polymers	274	392	500
Other	178	313	495

Prospects

Use of medicinal and aromatic plant materials as dietary supplements is guided by a mixture of myth, tradition, and science, frequently based on biases, misconceptions, and limited research. The lack of standardization of active constituents in medicinal plants has empowered the U.S. press and medical profession to frequently label medicinal plant materials snake oil, a derogatory term that implies the material is worthless as a medicine. To overcome this negative label, the future must bring to market medicinal and aromatic plant products with consistent levels of research-defined, active ingredients.

The education of consumers and healthcare workers in the appropriate supplement and pharmaceutical uses of medicinal and aromatic plants should lead to an honest evaluation of the therapeutic role these plant materials can play in individual health. The growth in product sales during the recent past helps identify a strong consumer interest, necessitating support of continued research in plant production and protection, support of clinical trials in herbal medicine, and development of standards that guarantee supplement wholesomeness and efficacy. A view to the future suggests eventual integration of pharmaceutical and complementary/holistic medicine within medical centers.

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