ANALYSIS OF THE ECONOMIC VIABILITY OF CULTIVATING SELECTED BOTANICALS IN NORTH CAROLINA

Edited version of a report prepared for Jeanine Davis and Jackie Greenfield by Strategic Reports, Inc. 2003

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1.0 Study Objective

The objective of this study is to determine the economic viability of cultivating selected botanicals in North Carolina. The botanicals listed in the table below were selected for two reasons.

1) All of the botanicals selected are either native to North Carolina or can be cultivated in North Carolina.
2) All of the botanicals selected have a long track record of applications in the medicinal herb/nutraceutical markets.

The botanicals analyzed in this study are listed below:

Common Name	***Scientific Name***
American ginseng	*Panax quinquefolius*
Black cohosh	*Actaea racemosa*
Bloodroot	*Sanguinaria canadensis*
False unicorn	*Chamaelirium luteum*
Ginkgo	*Ginkgo biloba*
Goldenseal	*Hydrastis canadensis*
Narrow-leaf purple coneflower	*Echinacea angustifolia*
Pale purple coneflower	*Echinacea pallida*
Purple coneflower	*Echinacea purpurea*
Skullcap	*Scutellaria lateriflora*
Wild indigo	*Baptisia tinctoria*
Wild yam	*Dioscorea villosa*

The following information was used to determine the economic viability of each target botanical:

- Estimated current and future consumption in the United States and Europe
- Identified key segments of the market
- Supply sources as they pertain to individual companies and countries
- Historical supply data
- Key drivers of demand growth
- Historical and projected price trends
- Changes in the regulatory environment
- Consumer and supplier concentrations
- Distribution channels
- Technology trends and developments
- Customer requirements
- Critical factors for success
- Specific factors for success in North Carolina
    - Soil/climate considerations
    - Cultivation and set-up costs

Another objective of the study is to understand individual manufacturer's requirements with regard to acquiring botanical raw materials. What are the company's minimum lot requirements? Does it acquire raw botanical materials directly from growers or does it employ "sourcing" specialists such as brokers? What are its current needs for each of the target botanicals and does it anticipate its requirements to increase, decrease or remain stable in the near future?

The selected botanicals were analyzed according to each manufacturer's annual usage of cultivated and wild-harvested stock, quality standards and requirements in terms of active ingredient levels and organic certifications, and material used for in-house processing of extract, powder or whole herb.

2.0 Research Methodology

*T*wo distinct research methodologies were used to fulfill the informational objectives of the study. Market assessments for each target botanical were made based on interviews with the leading manufacturers of botanical products in North America and Europe. Data collected from the interview process was then combined with our vast knowledge base of the botanical/nutraceutical industry.

This approach allowed the incorporation of contemporaneous data into historical models. "Noise" was then filtered out and market demand models were developed to fit closely with both collection methods.
The new data expanded the forecast model to include potential regulatory and structural changes that may affect consumer demand for, not only the botanicals in the study, but also the nutraceutical market as a whole.

Once the models were formulated, they were reviewed by experts in the industry via an extensive interview process. The end result is a market model that is rooted in historical data, but incorporates prescient business conditions and expert opinions to provide a vibrant, predictive decision-making tool.

3.0 Nutraceuticals

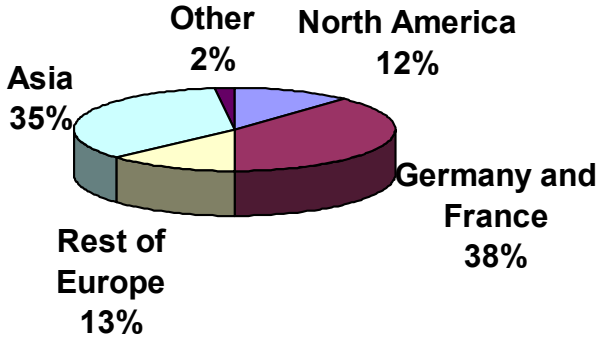
Nutraceuticals are a class of products that can be characterized as substances that are derived from organic sources and sold in medicinal forms such as tablets, elixirs or powders. They are believed to have a positive physiological effect or provide protection against disease for the user.

4.0 Medicinal Herbs

Medicinal herbs are plants, either cultivated or wild-harvest, that contain bioactive compounds used for medicinal purposes.

4.1 The Global Market for Medicinal Herbs

Global consumption at the retail level for medicinal herbs in 2001 was approximately 35 billion dollars. France and Germany accounted for the



largest share of the market at 38%. Asia was the third largest market with 35% followed by the remaining countries of Europe at 13%, North America at 12% and the rest of the world at 2%.

The growth in consumption averaged 7% to 9% from 1993 to 2001 and is expected to grow at an annual rate of 6% to 8% through the year 2008.

4.2 Demand and Efficacy

Demand for medicinal herbs is emanating from consumers who desire natural treatment alternatives to many existing drug treatments currently offered by the mainstream healthcare industry. In many countries throughout the world, health professionals and governments have been slow to respond to this grass roots movement. For example, the United States has taken a "hands-off" approach when dealing with the efficacy of herbal remedies.

Germany has a long tradition of embracing herbal remedies and has sanctioned many herbal extracts as effective treatment options for a variety of ailments through its government agency in charge of public health, *Commission E.*

Commission E. is a panel composed of scientists, doctors and other health professionals. The panel provides a monograph for hundreds of herbal remedies and endorses treatment options for German citizens based on its own research. *Commission E.* functions in much the same way as the *Food and Drug Administration (FDA)* in the United States.

The FDA does not evaluate the efficacy of herbal medicines; therefore, this study will use the recommendations of *Commission E.* as a basis for efficacy. A treatment option endorsement by *Commission E*. is an indication of official acceptance as to the effectiveness of herbal medicines. As such, it serves as a good benchmark by which to judge each herb in the target group in the context of the latest research and clinical trials. Only four countries in the world have medical communities that actively prescribe herbal medicines and provide insurance coverage for such treatments. They are China, India, Germany and Japan.

5.0 Characteristics of Target Botanicals

The target botanicals of this study have been selected as possible candidates for cultivation in North Carolina because each possesses the following characteristics:

- A long history of medical use for traditional treatments and/or modern treatments
- A defined market for raw material
- A natural range, which includes North Carolina
- The ability to be cultivated in North Carolina
- Diminishing natural supplies due to over harvesting
- Consumer and/or industrial interest

5.0.1 Parameters for Market Analysis

For purposes of this study, the market for wild-harvest material will only be evaluated as it applies to the price and demand dynamics of cultivated material. Also, comparisons made to market size in harvested pounds and dollar value will be shown as subsegments of the target group (i.e. all of the botanicals listed in the table on page 11) when this becomes necessary to maintain their numeric and graphic relevance. Any graphic or tabular presentations that are not representative of the entire target group will be noted as to their exclusions.

Although a trend toward consolidation and integration in the trade chains of the medicinal herbs industry has been noted, this industry is still highly fragmented and difficult to evaluate in its entirety. The complexity of the supply chains for medicinal herbs and the secrecy maintained by many participants regarding information relating to prices and volumes, leads to a lack of transparency in the industry. As a result, most industry insiders are not aware or equipped to comment on the entire supply or demand mechanisms at work in this market.

Many of the markets for individual medicinal herbs are too small to be tracked and monitored by state and federal trade bodies. Finding "hard" price and volume data for individual herbs is all but impossible for most of the botanicals in the target group. Estimates and projections used in regard to harvested volumes and prices are based on interviews with industry experts, finished goods market projections and the database of historical information.

Botanical Overview

5.1 Botanical Overview - American ginseng (Panax quinquefolius)

American ginseng (Am. ginseng) is native to North America with a natural range that extends north from Georgia to southern Quebec and west to the Rocky Mountains. It is a perennial that grows as an understory plant in densely shaded deciduous hardwood forests. The mature growth potential of the plant ranges from 9 inches to 26 inches in height. The plant has three compound leaves that sit atop a straight stem. Greenish-white flowers appear in June or July with red berries becoming evident by late summer. Harvesting occurs anywhere from three-to-ten years from seed depending on cultivation methods and customer expectations. The root is dried slowly at temperatures ranging from 60 degrees to 80 degrees Fahrenheit. Constant airflow, rather than high ambient temperatures, is used in the drying process to prevent damage to the root.

5.1.1 Bioactive Components - American ginseng

The main bioactive components of Am. ginseng are a diverse group of steroidal saponins called ginsenosides. As many as 25 different ginsenosides have been separated and cataloged as existing in the root of the ginseng plant. Ginsenosides demonstrate an ability to act on different tissues in the body in different ways. Research into the function and relevance of the various ginsenosides in medicine has been complicated by these sometimes contradictory and confusing reactions.

5.1.2 Uses and Treatments - American ginseng

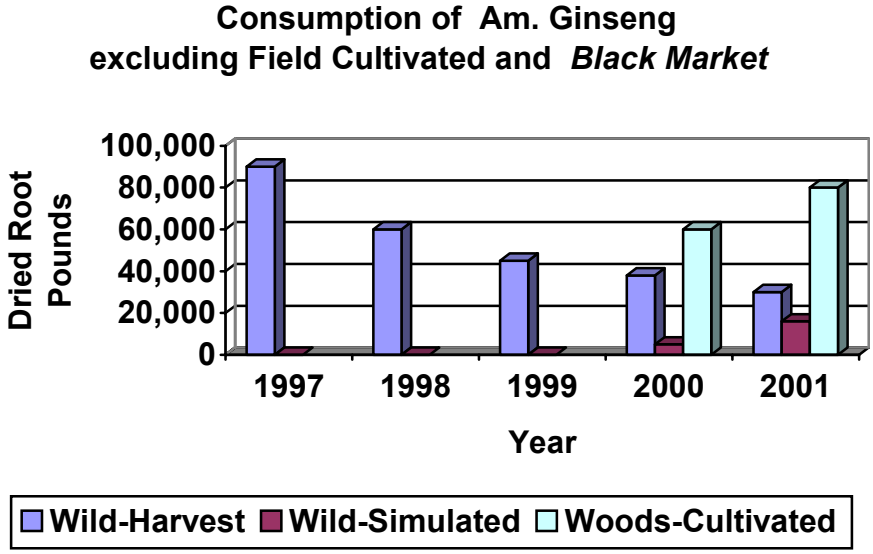
In North America and Europe, Am. ginseng is used to relieve stress, increase energy and improve mental acuity. In China and other countries of Asia, it has achieved almost mythical status as a panacea. Some of its uses according to Chinese medicine include curing sexual impotence, nervousness, vomiting and dyspepsia. In Germany, *Commission E.* approves Am. ginseng for the treatment of fatigue. Some of the medicinal uses for Am. ginseng are listed in Table 5.1.2 below.

Modern Uses	**Traditional/Folk Uses**
Reverses/prevents cognitive loss	Gastric disturbances, vomiting
Boosts the immune system	Impotence and sterility
Improves physical performance	Rheumatism and debility

5.1.3 Market Overview - American ginseng

5.1.3.1 Annual Consumption in Pounds - American ginseng

Wild simulated: Consumption of wild-simulated Am. ginseng is small in harvested pounds relative to the total consumption of the target group. Approximately 30,000 pounds of wild-harvest and 16,000 pounds of wild-simulated material made its way to market in 2001. Harvested pounds of "true" wild ginseng continue to drop as can be seen from the chart below. The combined consumption of wild-harvest and wild-simulated material represented about 1.2% of the total Am. ginseng harvest for 2001.

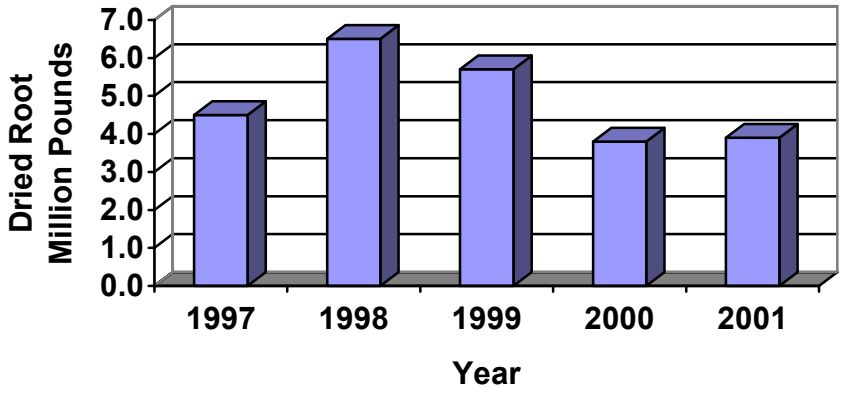


A large "black market" in the trade of wild Am. ginseng exists in North America. The numbers that we are reporting for wild-harvest material are based on official harvest estimates gathered from licensed ginseng sellers only. They do not include any estimate of the black market trade in raw root.

Woods cultivated: Consumption of woods-cultivated Am. ginseng is small to moderate in terms of harvested pounds per year. A significant amount of this material did not begin entering the market until the fall of 2000. As a result, the market for this material is still relatively undeveloped. In 2001, approximately 80,000 pounds of this material was sold on world markets. This represented 2.5% of the consumption for Am. ginseng in 2001.

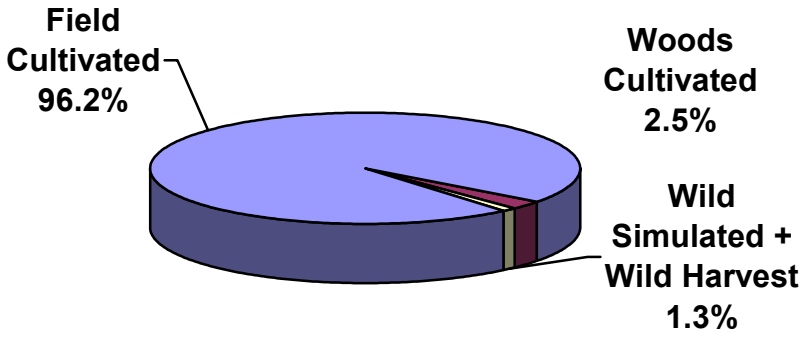
Field cultivated: Consumption of field-cultivated Am. ginseng is large in terms of harvested pounds. In 2001, approximately 3.9 million pounds of field-cultivated material was harvested in North America and sold on world markets. Canada produced 60% of the harvest in 2001 with the United States contributing the remaining 40%.

World Consumption of Field-Cultivated Am. Ginseng



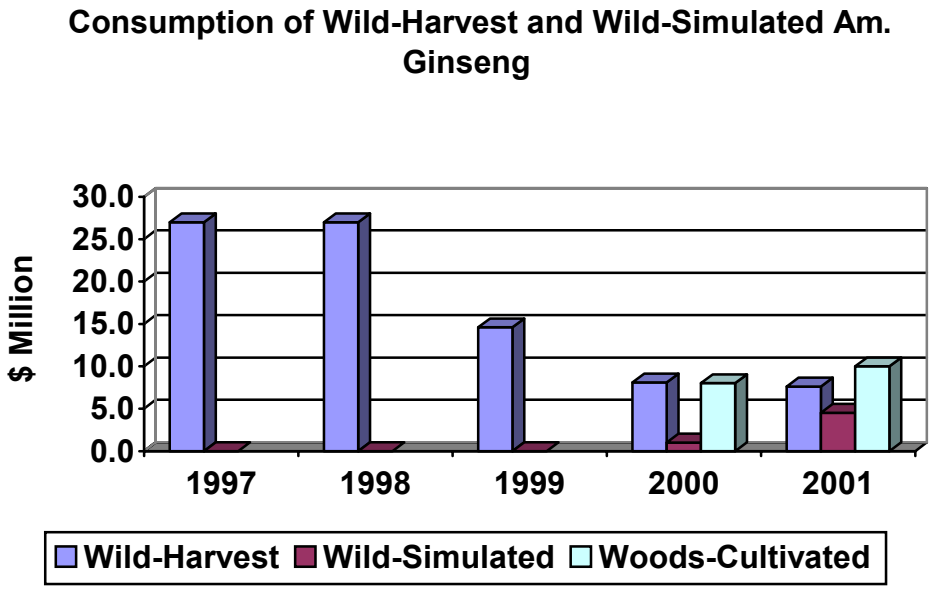
This represented 96.2% of the total consumption of Am. ginseng in 2001.

2001 Consumption of A. Ginseng, by type, in Dried Root Pounds as a Percentage of Total Am. Ginseng Pounds Consumed



5.1.3.2 Dollar Value of Consumption – American ginseng

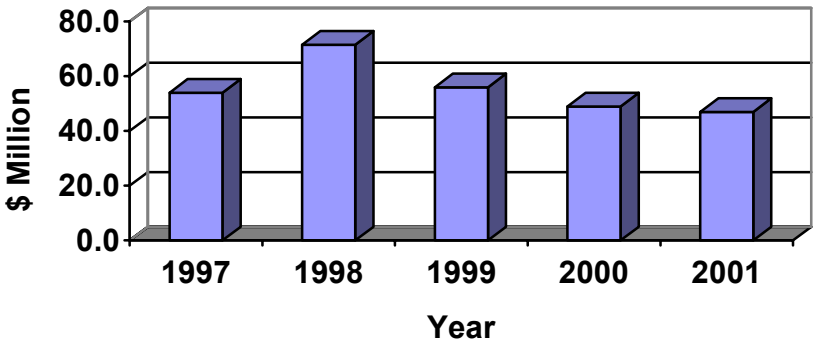
Wild simulated: Consumption for wild-simulated Am. ginseng is high in dollar value relative to the target group. This material carries the highest price per pound for dried root of any botanical in the target group with the exception of wild-harvest Am. ginseng. The dollar value of the 2001 consumption for wild-harvest and wild-simulated material was about $12.1 million. Of that amount, wild-simulated material accounted for $4.5 million in sales.



Woods cultivated: Woods-cultivated material is a much lower price than its wild-simulated cousin. Its dollar value in the market is about three times larger, however, since over six times as much material was available on world markets. The dollar value of consumption for this material in 2001 was approximately $10 million or 14.5% of the total Am. ginseng market.

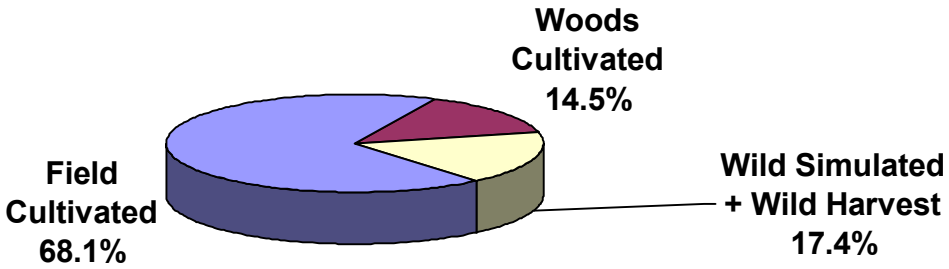
Field cultivated: Consumption for field-cultivated Am. ginseng is large in terms of dollar value. Although its price per pound can only be considered slightly above average when compared to the target group, the sheer size of the harvest (3.9 million pounds in 2001) makes this crop second only to Ginkgo biloba in dollar value. 2001 consumption of this material was approximately $47 million.

Consumption of Field-Cultivated Am. Ginseng



Consumption in dollars for the Am. ginseng market (excluding the black market) was $69.1 million in 2001. Field-cultivated material comprised $47 million or 68.1% of this amount.

2001 Am. Ginseng Consumption by Type as a Percentage of Total Am. Ginseng Dollars



5.1.4 Supply/ Demand Balance - American ginseng

Wild simulated: Significant quantities of this material did not begin entering the market until the fall of 2000. Since then, it has exhibited strong levels of demand from Asian customers who had exclusively purchased wild-harvest Am. ginseng in the past. Diminishing sources of wild populations will continue to increase demand for this material.

Woods cultivated: Supply and demand are currently very stable for woods-cultivated Am. ginseng. Players in this market tend to be well integrated with one another. Consistent demand enables suppliers to anticipate the needs of the market very efficiently. Like wild-simulated material, significant quantities of this material did not come to the market until the fall of 2000.

Field cultivated: Supplies of field-cultivated material currently exceed demand. Strong imbalances over the past five years have driven prices sharply lower. Only within the last two years has supply begun to drop as inefficient growers are forced to exit the market. Although too much supply remains in the market, upward supply momentum has abated. This, in combination with consistent demand growth, may bring equilibrium to this market within the next two-to-three years.

5.1.5 Key Drivers of Demand Growth - American ginseng

Wild simulated: Favorable comparisons to "true" wild-harvest are essential to growth prospects. As the economies of the Far East continue to improve, demand for this type of Am. ginseng will increase at a rate well above the average growth rate of the target group. Continued contraction of the wild-harvest supply due to over harvesting and increasing government restrictions on the harvest of wild populations will create a supply void in the wild material market that only wild-simulated material can fill. ***Wild populations of Am. ginseng are protected by various state regulations and the species is currently listed by CITES in Appendix 2 as endangered in its natural habitat.***

Woods cultivated: The growing popularity of organic growing methods and organic certification will increase demand for woods-cultivated Am.

ginseng. Woods-cultivated material is grown in prepared soil beds located in naturally wooded areas - land that has never been farmed in the past. As a result, the land does not have to lay fallow for a period of up to three years (to leach possible pesticide and fertilizer contamination) in order to grow crops that can be certified as organic.

Field cultivated: Other segments of the nutraceuticals market will fuel added demand for this version. Incorporation into functional foods, health beverages, and animal products should keep demand for this material in a gently sloping up trend for the next three-to-five years. Favorable clinical results are also very important to the growth potential of this material.

5.1.6 Price Volatility - American ginseng

Wild simulated: As harvest volumes continue to decrease for wild-harvest Am. ginseng, wild-simulated harvest volumes continue to increase. The dynamics of this changing market share between "true" wild material and wild-simulated material have created only moderate price volatility for wild-simulated Am. ginseng as compared to the target group as a whole. In 2001, prices for this material ranged from $190 to $250 per pound of dried root.

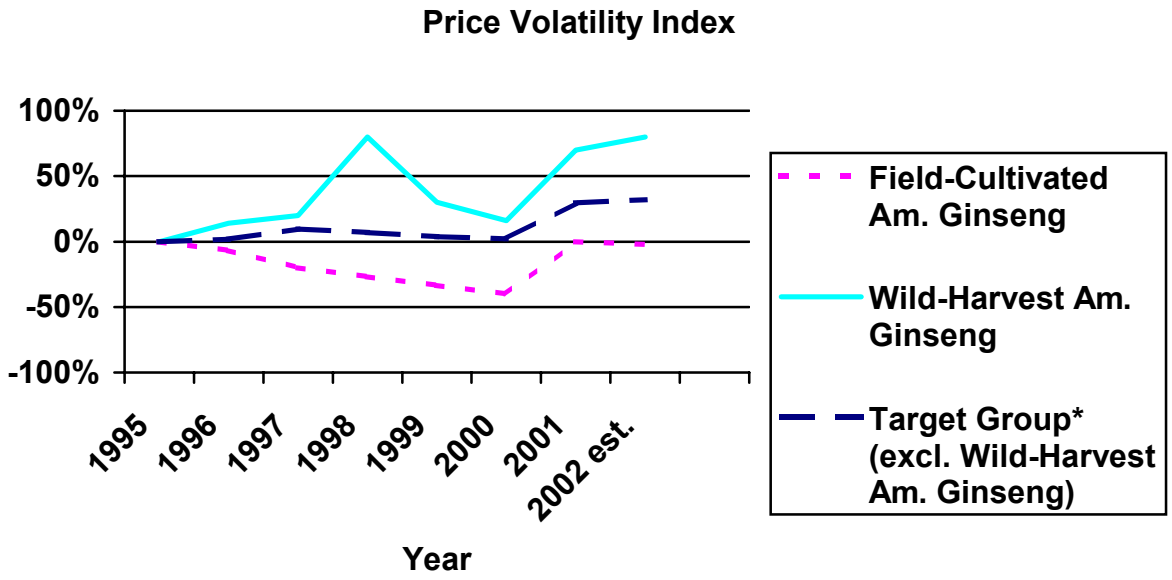
The price volatility of wild-simulated material will probably increase over the next two-to-four years as harvests of "true" wild material continue to decrease. Growers of this material will increase harvest cycles in the hope of achieving more favorable comparisons to "true" wild material. As this material approaches the physical characteristics of "true" wild material, its price pattern will become more erratic. See chart 5.1.6.1.

Woods cultivated: Although this market is relatively immature, price patterns have remained very stable in a moderate price band. These patterns are the result of the high degree of integration among growers and buyers. In 2001, prices for this material ranged from $60 to $110 per pound of dried root.

Field cultivated: Field-cultivated ginseng was in a declining price pattern from the mid-1990's to the middle of 2000. Although demand continued to increase at a modest rate throughout this period, too much supply flooded the market putting downward price pressure on this commodity.

Only recently has enough supply dropped out of the market to stabilize prices in a low-to-moderate price band relative to the target group. Prices in 2001 for this material ranged from $10 to $14 per pound of dried root. Chart 5.1.6.1 shows the price volatility of field-cultivated Am. ginseng as it compares to wild-harvest material and the target group*.

Chart 5.1.6.1



5.1.7 Customer Concentration – American ginseng

Wild simulated: Over 90% of the wild-simulated harvest is destined for the Asian markets. Much of this material moves through the demand chain in its whole-root form all the way to the ultimate consumer. The material is collected, stored and shipped to ports in Asia for final dissemination. Most ginseng trade to and from North America still takes place through the port of Hong Kong.

Woods cultivated: Customers of this material tend to be small-to-medium size extract producers who serve the needs of a slowly growing intermediate and retail market. Large-scale extract producers are not interested in paying a substantially higher price for this product as compared to field-cultivated

material. The woods-cultivated product is moved through a broker network similar to the one used for wild-simulated material.

Field cultivated: Over 96% of the Am. ginseng sold on world markets is field-cultivated material. Customers for dried root are widely dispersed throughout the world. Although some material filters through the demand chain to the ultimate consumer in its dried root form, most is processed into extract or powder by large-scale operators.

5.1.8 Supplier Concentration – American ginseng

Wild simulated: **The entire world supply of this material comes from North America.** The *Appalachian Ginseng Foundation* (AGF) estimates that as many as 10,000 growers of wild-simulated ginseng are on the Appalachian Range. Most of these growers are small-scale operators that grow the crop in remote locations for fear of poachers. A smaller number of similarly sized growers are also located in the Pacific Northwest.

Woods cultivated: North America currently supplies the world with its entire supply of woods-cultivated material. The distribution of growers is similar to that of wild-simulated ginseng except that the growers are fewer in number and operate on a larger scale. Whereas a typical area for wild-simulated cultivation rarely exceeds one-half acre, growers of woods-cultivated material may have two or more acres under cultivation.

Field cultivated: Although field cultivation of American ginseng is occurring in Europe and Asia, these endeavors are small in scale and have not made any significant impact on the supply structure of this material. North America is still the dominant supplier of this product. Large-scale pockets of cultivation are located in Marathon County, Wisconsin, large

portions of Canada and the northwestern United States.

Companies associated with American ginseng

P - Powder
C -Use/ Produce Certified Organic Material
E - Extract
R - Whole Root/ Herb

5-HTP Co. Ltd.	E,C	Health4All Products Ltd.	R,P
A.M. Todd Company	E	Herbalist & Alchemist	R
Aceto Corporation	E	Honson Ingredients Ltd.	E
ACTA Health Products	E	Hsu's Ginseng Enterprises	P,E,C,R
Advanced Herbal Ingredient Inc.	E,C	Huazhong Pharmaceutical Co. Ltd.	E
Advanced Labs	P,C	Hunan Botanical Industrial Co. Ltd.	P,E,C
AF Nutraceutical Group Inc.	E	Imperial Ginseng Ltd.	P,E,C,R
AHD International	P,E,C	Integrity Nutraceuticals International	E
AIDP Inc.	E	IRMA Corp.	P,E,C
Alfa Chem	P,E	Jilin Province Hongjiu BioTech Co. Ltd.	E
AMAX NutraSource Inc.	E	Jinke Group USA Inc.	E
American Botanicals	E,R	Klickitat Organics	P,C
American Ingredients	P,E	Longstar International Inc./J & P Nutriceutical Services	P,E
Amitco International	P,E	Mafco Natural Products	P
Arise & Shine Herbal Products	P	Maypro Industries Inc.	P,E
Ashland Distribution Co.	P	Mayway Corp.	P,E
ASI International Inc.	P,E	MiniStar International Inc.	E
Asia Natural Products Inc.	P	MTC Industries Inc.	P,E
Asiamerica International Inc.	P,E	Nature's Cathedral	R
ATZ Natural - Div. of ATZ Chemical Inc.	E	Nature's Way Products	P
Ayush Herbs Inc.	E	NatureGen Inc.	E
B & K International/Famarco Ltd. Inc.	P	Naturex Inc. (Brucia Plant Extracts- US)	E,P
BattleChem Distribution Inc.	E	NHK Laboratories Inc.	P,E
BDS Natural Products	P	Northwest Botanicals Inc.	P,C
Beehive Botanicals Inc.	P	NuLiv Science Inc.	P,E
Bell Flavors & Fragrances	E	Nutrilife LLC (China)	P,E
Bella Vita Botanicals Inc.	R	OptiPure Chemco Industries Inc.	E
BI Nutraceuticals - Div. of Hauser	P,E	Orcas International Inc.	P,E
Bio-Botanica Inc.	E	Organic by Nature/Green Kamut Corp.	P
Blue California	E	P.L. Thomas & Co. Inc.	E
California Energy Nutriceuticals - C.E.N.	P	Pacific Botanicals	R
Canfo Natural Products Co. Ltd.	P,E,C	Pacific Rainbow International Inc.	E
Cape Cod Organics & Nutraceuticals Corp.	P,E,C	Pharmachem Laboratories Inc.	P,E
Chai Na Ta Corporation	P,E,C,R	Pharmline Inc.	P,E

Chart Corp. Inc.	P,E	Premium Ingredients Ltd.	P
China Herbs and Natural Products	P	Pure World Botanicals Inc.	P,E
China MEHECO Herbs I/E Corp.	E	Quality Botanical Ingredients Inc.	P,E
Chinese Herbal Ingredient Inc.	E,C	R.W. Greeff & Co.	P
Chinese Natural Herbal Extracts Group Inc.	P,E,C	RFI Ingredients	P,E
Cognis Nutrition & Health	E	RIA International LLC	P,E
CPB International Inc.	E	Rishi Tea	P
Danisco USA Inc.	E	RMA Laboratories Inc.	E
Dempsey Corp.	E	Ruger Chemical Co. Inc.	P,E,C
DNP International Co. Inc.	E	SPC Pharma Inc.	E
E.M. Sergeant Pulp & Chemical Co. Inc.	P	Sampac Enterprises	P,E
Ecuadorian Rainforest LLC	P,E,C	San Francisco Herb & Natural Food Co.	P,E,R
Energique Inc.	E	Scidoor Hi-Tech Biology Co. Ltd.	E
Essential Wholesale	E	Soft Gel Technologies Inc.	E
EUL International Herb Mfg. Inc.	P,E,C	Solgar	P,E
Exquim S.A.	E	Source Connections LLC	E
Exxentia	E	Stauber Performance Ingredients Inc.	P,E
Falcon Trading International	P,E,C,R	Stryka Botanics	P,E
FCC Products Inc.	P	Synergy Production Laboratories	P,E,C
Fortune Bridge Co. Inc.	P,E	TCD China	E
Frutarom Inc.	P,E	To Your Health	P,E,C
Functional Foods Corp.	P	Triarco Industries	P
Garuda International Inc.	P,E	Triple Crown USA Inc.	P,E
GCI Nutrients	P,E	Trout Lake Farm	R
Gee Lawson Nutritional	E	Trusperity USA Inc.	E
Ginco International	P,C,R	U.S. Nutraceuticals LLC	P
Global Marketing Associates Inc.	E	United Nutrition LLC	E
Gourmet Nutrition	P,E	Vitality Works Inc.	E,C
Green Biochemicals Inc.	E	Westco Fine Ingredients	E
H&A (Canada) Industrial Inc.	P	Whole Herb Co.	P,E,R
Hainan Zhongxin Chemical Co. Ltd.	E	Wright Group, The	E
Hathaway Allied Products Inc.	E	Wisconsin Co-op	R

5.1.9 Barriers to Entry - American ginseng

Wild simulated: Entrants into this market will meet only moderate barriers relative to the target group. Raw material costs, mostly in the form of seed costs, have been steadily declining. Maintenance of the crop is low in terms of labor and equipment. Harvesting costs are high as compared to field crops due to the heavy reliance on manual labor. As harvest time approaches, the possibility of crop loss due to poaching is a major concern. The costs of securing the crop must be considered in the economic decision.

Woods cultivated: Entry into this market can also be classified as moderate but for different reasons. Seed costs remain low, but soil preparation costs are much higher. Soil beds must be tilled and weeded in areas not readily accessible to machinery. This requirement creates higher labor costs for the maintenance of the crop. These higher costs are offset in some part by lower harvest costs. Security concerns and costs are also lower for this crop because it is not a player in the "true" wild ginseng market.

Field cultivated: Barriers to entry into this market are high relative to the target group. Although seed costs are low, site preparation costs are extremely high. Ginseng cannot grow in full sunlight and requires artificial shading to grow in open-field conditions. Costs associated with shade-cloth cultivation are very high.

Large monocultures of Am. ginseng require an increased use of disease and pest controls. Additionally, land used for one crop cycle cannot be used again for at least twelve years without incurring a substantial decrease in yield.

Labor costs are lower since existing machinery can harvest the crop. Opportunity costs are also lower as compared to woods and wild cultivated materials. Harvesting occurs 3 years to 5 years from seed for field-cultivated material, as compared to 5 years to 7 years for woods-cultivated and 8 years to 15 years for wild-simulated material. The highest barrier of entry into this market is the large number of players currently in the market and their reluctance to exit even as profit margins become razor thin.

5.1.10 Distribution Channels - American ginseng

Wild simulated: Distribution channels are very specialized. Growers deal with established "wild" ginseng brokers who work for clients in Asia. Demand in this market is fueled by **qualitative rather than quantitative** measures. Growers must be able to meet the requirements of the broker to garner a price relative to wild-harvest material.

Woods cultivated: A small number of well-established growers deal mainly with ginseng brokers representing Asian interests. Some growers sell directly to small-to-medium size extract producers and export companies.

Field cultivated: Distribution channels are highly structured and vertically integrated. Many large growers deal directly with large extract producers on a contractual basis or as a fully integrated supplier. Conversely, many smaller growers have formed cooperatives through which they negotiate with buyers.

5.1.11 Key Customer Requirements - American ginseng

Wild simulated: The resemblance to aged, wild-harvest Am. ginseng is vital to its market value. Generally, this material must be at least ten years from seed in order to command prices close to "true" wild-harvest A. ginseng.

Woods cultivated: Key customer requirements for this product are a threshold level of 5% ginsenosides as a percentage of clean dried root material and an absence of chemical residuals. Organic certification is also a requirement for a number of purchasers.

Field cultivated: Customer requirements for this material are similar to those of woods-cultivated material. However, they expect prices well below those of other versions of Am. ginseng. At present, most buyers are willing to pay only a modest premium for organically certified material. This status may change as issues regarding chemical and heavy metals residues in a variety of crops continue to make headlines. Typical bioactive requirements are a threshold level of 5% ginsenosides.

5.1.12 Recent Developments - American ginseng

Until very recently, economic weakness in Asia hurt the demand for Am. ginseng; however, these economies, led by China, are beginning to experience signs of a strong economic rebound. It is estimated that China will experience 8% growth in 2002 GDP. Taiwan, Singapore and Malaysia have also turned the corner and seemed poised for improved growth rates.

Wild simulated*:* Increasing government regulation of wild harvesting continues to build price support for this material. Improving trade relations with China is resulting in lower tariffs for root exported from the United States and Canada.

***Woods cultivated**:* The increasing popularity of organic foods and food supplements continues to create a niche market for this product.

Field cultivated: Canadian production of this version continues to consolidate as high-cost growers are forced out of the market. The process is proceeding at a very slow rate and oversupply is still putting negative price pressure on this material.

5.1.13 Commercial Visibility - American ginseng

The ginseng market is highly visible throughout the world. Ginseng is second only to Ginkgo biloba in the target group in terms of pounds of raw material consumed in the world. Am. ginseng, a subset of the overall ginseng market, has continued to gain market share at the expense of Siberian ginseng. Of the leading nutraceutical/botanical companies in North America and Europe, 43% offer Am. ginseng as a stand-alone product, and 62% offer Am. ginseng as either a stand-alone product or as part of a multi-constituent supplement.

5.1.14 Suitability to North Carolina Cultivation - American ginseng

Wild simulated: Mountainous regions of North Carolina are ideal for this type of cultivation.

Woods cultivated: Many areas exist in North Carolina that are very conducive to woods cultivation techniques.

Field cultivated: The natural resources that North Carolina has at its disposal make this the poorest of the three cultivation options.

5.1.15 Overall Assessment - American ginseng

Wild simulated: Wild-simulated Am. ginseng is an excellent candidate for production. The market for this material will remain strong, and prices will remain very high relative to the target group. This material's high price

makes it a prime candidate for poachers. As a result, planting should only take place in small, secluded areas that are easily defensible.

Woods cultivated: The potential for woods-cultivated Am. ginseng in North Carolina is very good. The habitat requirements for this material are very conducive to many parts of North Carolina. The more pressing issue for this product is whether growers should build price protection into the crop by organic certification or through an effort to enter the "true" ginseng market by increasing seed-to-harvest times.

Field cultivated: Opportunities for this material are limited at this time. Large investments made years earlier by growers currently in this market continue to keep them in the game in the hope of better prices ahead. Until major players in this market realize that supply cannot remain at current levels in the anticipation that demand will eventually catch up, prices will continue to remain under downward pressure.

American ginseng will experience moderate growth in the range of 5% to 10% over the next three-to-five years. Demand for field-cultivated material should increase 5% annually over this period. Supplies of field-cultivated material will slightly lag demand over the next 12 months to 18 months firming prices at the current level of $12 to $16 per pound of dried root.

Demand for wild-simulated and woods-cultivated material should benefit more from the improving economies of Asia than field-cultivated material. Demand for these materials will increase 10% to 20% annually over the next three-to-five years. Supplies of these materials will increase over the same period, but not at a sufficient rate to prevent moderate upward price pressure.

5.2 Botanical Overview - Black cohosh (Actaea racemosa)

Black cohosh is native to North America and can be found in shaded woodlands located in the eastern United States and portions of southern Canada. It is a perennial that has a mature height of about 4 1/2 feet and grows at a rate of 18 inches to 22 inches per month. It is in flower from July to October with seeds ripening from August to October. In autumn, after the fruit has formed and the leaves begin to die, the root is harvested four-to-six years from seed. The root is air dried in temperatures ranging from 100 degrees to 140 degrees Fahrenheit.

5.2.1 Bioactive Components - Black cohosh

The main bioactive components of Black cohosh are the triterpene glycosides*, acetein and 27-deoxyactein*, and the isoflavone *formononetin*. Other components include aromatic acids, tannins, resins and fatty acids. Black cohosh has been clinically proven to create an "estrogen-like" effect in the user. Research has also shown it decreases luteinizing hormone secretions, which are a cause of hot flashes in menopausal women.

5.2.2 Uses and Treatments - Black cohosh

Native Americans used Black cohosh for a variety of medical conditions ranging from gynecological problems to snake bites. Physicians used it in the 19th century to treat fever, menstrual cramps and arthritis. In Europe, Black cohosh has been used for over 40 years as a treatment for menstrual pain. In recent years, this material has been used as a treatment alternative to mainstream Hormone Replacement Therapy (HRT). Germany's *Commission E*. recommends Black cohosh for "Climacteric complaints" and "Premenstrual syndrome (PMS)". Table 5.2.2 summarizes the most common uses of Black cohosh in modern and traditional medicine.

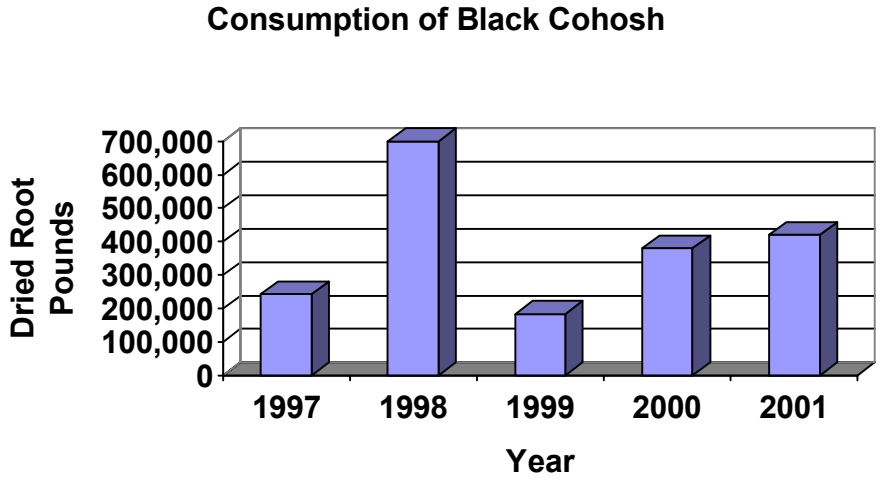
Table 5.2.2

Modern Uses	**Traditional/Folk Uses**
Climactic complaints	Rheumatism
Premenstrual syndrome (PMS)	Sore throats and bronchitis
Hormone replacement therapy	Snake bites

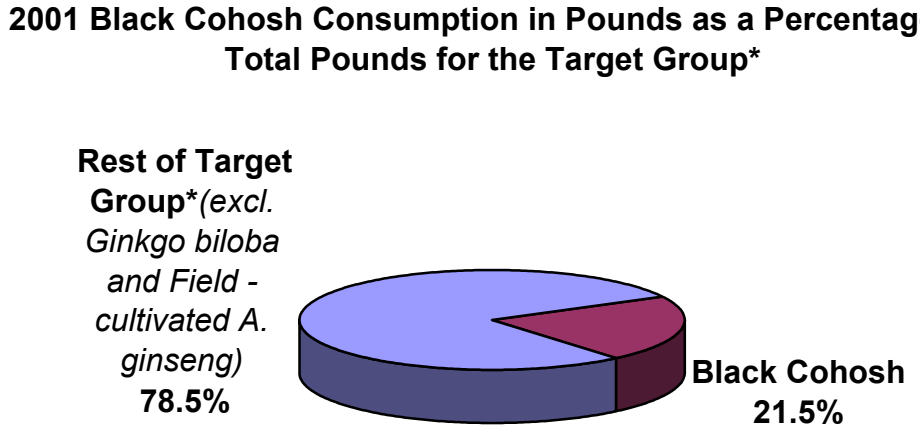
5.2.3 Market Overview – Black cohosh

5.2.3.1 Annual Consumption in Pounds – Black cohosh

In 1998, almost 700,000 pounds of Black cohosh dried root was consumed. All of this material came from wild-harvest sources. In 1999, world consumption dropped to about 183,000 pounds. It rebounded sharply to approximately 420,000 pounds in 2001.

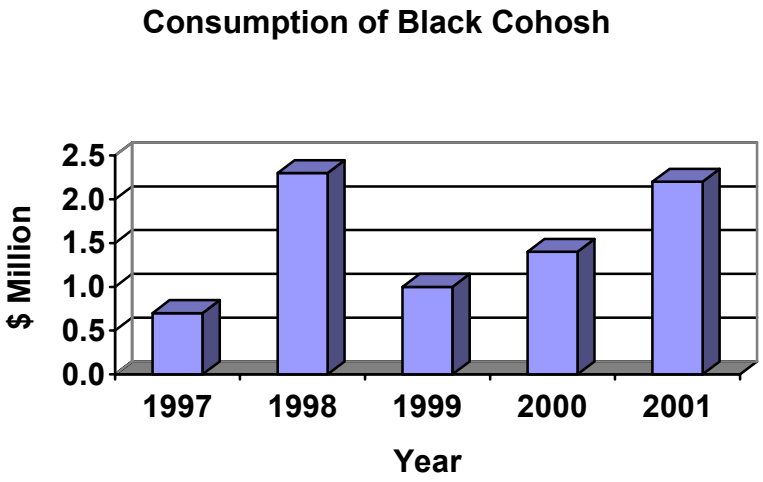


Interest in this material has accelerated over the past 18 months. Projections of consumption well in excess of 500,000 pounds in 2002 are not uncommon. Black cohosh's 21.5% share of the world market for the target group* will increase in the next three-to-five years.

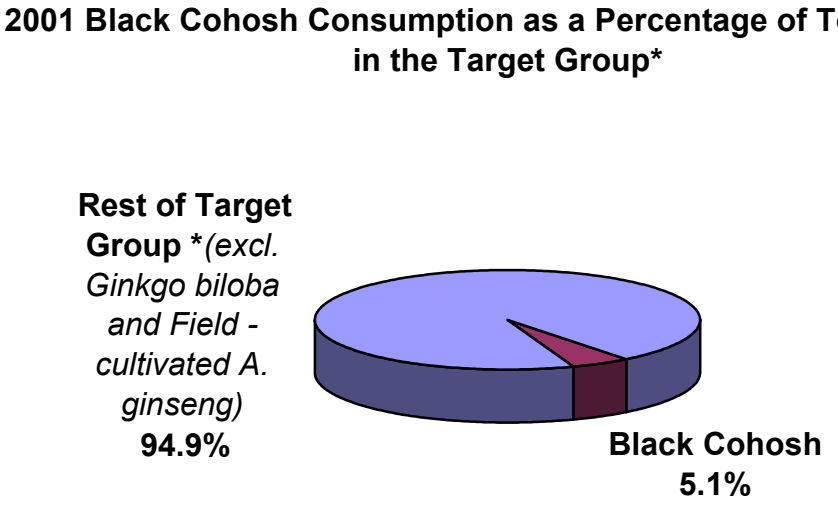


5.2.1.2 Dollar Value of Consumption – Black cohosh

The dollar value consumption for Black cohosh is moderate compared to the target group*. Prices for this material have been increasing steadily since the autumn of 1999; however, it still trades in a low price band. The value of consumption in 2001 was estimated at $2.25 million.



This amount represents 5.1% of the total dollar value for the target group* in 2001.



5.2.4 Supply/Demand Balance – Black cohosh

Supplies of this product come mostly from the harvesting of native populations. Only small quantities of cultivated material have made its way to market. Prices have risen steadily throughout this period, but have not thus far triggered a strong response among growers to cultivate this material.

Supplies are becoming unstable. Many of the large, easily harvested wild populations have already been exhausted. Suppliers scouring the countryside have to go further off the beaten trail in search of smaller, more widely scattered sources. Accelerating demand in the face of uncertain supplies may lead to major imbalances that can only be alleviated in the short run by substantially higher prices.

5.2.5 Key Drivers of Demand Growth – Black cohosh

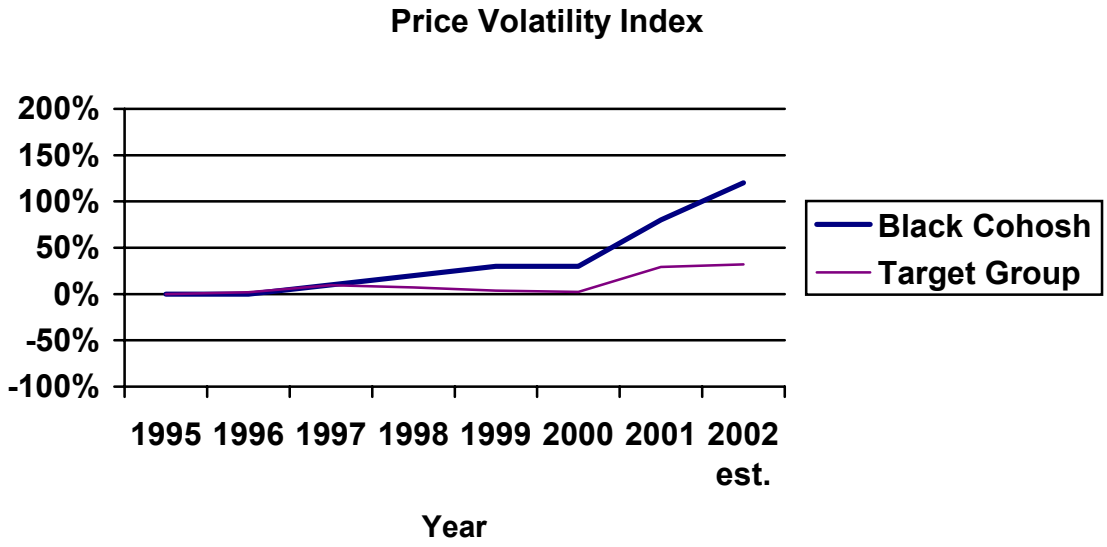
There are growing health concerns over Hormone ReplacementTherapy treatments currently on the market. Many health professionals are looking to Black cohosh and other natural substances as potential treatment options for hormone depletion. Positive clinical results as a HRT continue to drive demand for this material. Demand for cultivated product will increase as naturally occurring populations become fewer in number and more widely dispersed.

5.2.6 Price Volatility – Black cohosh

Black cohosh has experienced a significant increase in demand over the last 18 months. This increased demand has been satisfied solely by additional wild-harvest material coming to market. In 1998, demand tripled from the previous year to almost 756,000 pounds. However, due to the easy access of wild populations, the price increased by only 40 cents per pound from 1997 levels. In 2001, the price per pound of dried root was in the $3 to $5 range.

Highly concentrated, easily accessible large natural populations have already been exploited. They have not been able to satisfy the recent spike in demand that has occurred during the later half of 2002. As a result, prices

have increased and this material currently trades in the range from $5-$7 per pound.



5.2.7 Customer Concentration – Black cohosh

Only a few decades ago, the vast majority of the Black cohosh harvest was sent to Europe for processing and consumption. In the last decade, interest in North America for this botanical has increased dramatically.

5.2.8 Supplier Concentration – Black cohosh

Suppliers of this botanical are well dispersed throughout the natural range. They are more prevalent in the southeastern region of this range because that is where the largest concentration of large wild populations exists. Cultivation efforts are currently underway in the United States and Europe, but no more than 10% of the 2001 harvest was generated from cultivated sources.

Companies associated with Black cohosh

P - Powder
C - Use/ Produce Certified Organic Material
E - Extract
R - Whole Root/ Herb

A.M. Todd Company	E	Hawk Biopharma	E
ACTA Health Products	E	Herbalist & Alchemist	E,P,R
Advanced Herbal Ingredient Inc.	E	Herb Trade Inc.	P,C,R
Advanced Labs	E,C	Herbco International Inc.	P
AerChem Inc.	P	Hunan OSST Herb-Pharma Inc.	E
AF Nutraceutical Group Inc.	E	Indena USA Inc.	E
AHD International	E	Infinity Industries	E
Alfa Chem	P,E,C	Infinity Marketing Group Inc.	P,E
AMAX NutraSource Inc.	P,E	Ingredients International Inc.	P,E
American Botanicals	E	IRMA Corp.	P,E
American Ingredients	R	JF Chemical Sales Inc.	E
Amitco International	P,E	Ji'an Natural Plant Extraction Factory	E
AnMar International Ltd.	P,E	Jinke Group USA Inc.	E
Ashland Distribution Co.	E	Kingchem Inc.	E
ASI International Inc.	P	Klickitat Organics	P,C
Asia Natural Products Inc.	P,E	Longstar International Inc./J & P Nutriceutical Services	P,E
Asiamerica International Inc.	P	Mafco Natural Products	P
ATZ Natural - Div. of ATZ Chemical Inc.	P,E	Marcor Development Corp.	E
B & D Nutritional Ingredients Inc.	E	Martin Bauer Group	E,P
B & K International/Famarco Ltd. Inc.	E	Maypro Industries Inc.	P,E
BattleChem Distribution Inc.	P	MediHerb	P,E,R
BDS Natural Products	E	MiniStar International Inc.	E
Bella Vita Botanicals	P,E	Monteloeder SL	E
BI Nutraceuticals- Div. of Hauser	R	Natural Herbs	P
Bio-Botanica Inc.	P,E	Nature's Sunshine Products	E,P
Blue California	E	Nature's Cathedral	R
Buckton Scott Nutrition Inc.	E	Nature's Way	E,P,R
California Energy Nutriceuticals	E	Naturex Inc.	E
Canfo Natural Products Co. Ltd.	P	NHK Laboratories Inc.	P,E
Cape Cod Organics & Nutraceuticals Corp.	P,E,C	Northwest Botanicals Inc.	P,C
Chart Corp. Inc.	P,E,C,R	Novel Ingredient Services LLC	P,E
Cherain Chemicals	P,E	Nutrichem Resources Co.	E
China Herbs & Natural Products International Corp.	P,E	Nutrilife LLC (China)	E
China Jiangsu International Economic-Technical Coop. Corp.	E	Omana Group LLC	E
China MEHECO Herbs I/E Corp.	P,E,C	Orcas International Inc.	E
Chinese Herbal Ingredient Inc.	P,E	P.L. Thomas & Co. Inc.	P,E
Cognis Nutrition & Health	E,C,R	Pacific Botanicals	P,C,R
CPB International Inc.	E	Pacific Rainbow International Inc.	E

Crystal Innovation International	E	Pharmachem Laboratories Inc.	P,E
Dalian Tianshan Industrial Co. Ltd.	P,E	Pharmline Inc.	P,E
Dempsey Corp.	P,E	Pure World Botanicals Inc.	P,E
Deyang Shutai Ginkgo Development Co.	E	Quality Botanical Ingredients Inc.	P,E
DNP International Co. Inc.	P,E	R.W. Greeff & Co.	P
DOSIC	E	Renaissance Herbs Inc.	E
Draco Natural Products	E	RFI Ingredients	P
E.M. Sergeant Pulp & Chemical Co. Inc.	E	RIA International LLC	P,E
E.T. Horn Co.	P	Ridge Runner Trading	R
Ecuadorian Rainforest LLC	E	RMA Laboratories Inc.	E
Elixir International of New Mexico Inc.	P,E	Sami Labs Inc.	E
Energique Inc.	E	San Francisco Herb & Natural Food Co.	P,R
Essential Wholesale	E	Schaper & Brummer AG	P,E
EUL International Herb Mfg. Inc.	E,R	Scidoor Hi-Tech Biology Co. Ltd.	E
Euromed USA	P,E,C	Shanghai Freemen International Trading Co. Ltd.	P,E
ExtractsPlus Inc.	E	SPC Pharma Inc.	E
Exxentia	E	Solgar	P,E
Falcon Trading International	E	Starwest Botanicals Inc.	P,E
FCC Products Inc.	P,E,C	Stauber Performance Ingredients Inc.	E
Fortune Bridge Co. Inc.	P	STC International Inc.	P,E
Functional Foods Corp.	P,E	Stryka Botanics	E
GCI Nutrients - Italy	P,E	Suan Farma Inc.	P,E,C
Gee Lawson Nutritional	P,E	To Your Health	P,E
Global Marketing Associates Inc.	P,E	Triarco Industries	P,E
Gourmet Nutrition	E	Triple Crown USA Inc.	P,C,R
Green Biochemicals Inc.	P,E	Trout Lake Farm LLC	E,R
GuiLin Natural Ingredients Inc.	E	Trusperity USA Inc.	P
Hainan Zhongxin Chemical Co. Ltd.	E	U.S. Nutraceuticals LLC	E
Harten Corp.	E	United Nutrition LLC	E,C
Honson Ingredients Ltd.	P,E	Vitality Works Inc.	P,E
Huazhong Pharmaceutical Co. Ltd.	E,C	Watson Industries Inc.	E
Hunan Botanical Industrial Co. Ltd.	E	Westco Fine Ingredients	P,E,R
		Whole Herb Co.	E
		Wonder Trading USA Inc.	E
		Wright Group, The	E
		Xi'an Sanjiang Bio-Engineering Co. Ltd.	E
		Xinguang Ind Prod I/E Corp.	E

5.2.9 Barriers to Entry – Black cohosh

Black cohosh requires artificial shading to be cultivated in open field conditions. Although this material thrives in the same natural environment as Am. ginseng, it is more tolerant to light and soil variations. Large quantities

of seed are not readily available. Black cohosh does best in a woods-cultivated or wild-simulated environment. This factor makes harvest costs higher relative to field cultivation due to a greater reliance on manual labor to bring in the crop.

5.2.10 Distribution Channels – Black cohosh

Renewed interest in this material by pharmaceutical companies has led to larger companies contracting directly with wild-harvest suppliers. Interest in cultivation, particularly organically certified cultivation, has also increased. Still, the majority of this material continues to flow through general brokers. The largest players are actively pursuing integrated cultivation options, but players of every size exist in the business. Higher root prices will continue to keep small collectors foraging for natural populations.

5.2.11 Key Customer Requirements - Black cohosh

High levels of triterpene glycosides in the range of 2% and isoflavones are the primary customer requirements for this material. An increasing number of buyers are requiring organic certification for this botanical.

5.2.12 Recent Developments – Black cohosh

This product remains a strong competitor in the lucrative HRT market. It continues to receive strong clinical support as a treatment for menopausal symptoms worldwide.

5.2.13 Commercial Visibility – Black cohosh

This material was identified as one of the fastest growing herbal products in 1998. It has found its way into a number of commercial products, including the early 20th century product “Change-O-Life” formula and, more recently, “Remifemin”. Remifemin is a derivative of Black cohosh and was introduced as a prescription drug in Germany in the 1950’s. In 1997, GlaxoSmithKline marketed it in this country as "Remifemin Menopause".

Of the leading nutraceutical/botanical companies in the United States and Europe, 46% offer Black cohosh as a stand-alone product, and 65% offer this material as either a stand-alone product or as part of a multi-constituent supplement.

5.2.14 Suitability to North Carolina Cultivation - Black cohosh

North Carolina is excellent for the cultivation of Black cohosh, especially in the western regions of the state. Large wild populations of Black cohosh can still be found in many western regions of the state.

5.2.15 Overall Assessment - Black cohosh

Commercial interest in this material has never been greater. Naturally occurring populations will not satisfy the expected increase in demand over the next three-to-five years. A lack of significant cultivation currently in the pipeline creates an opportunity for North Carolina growers to fill the gap in supply as wild populations continue to decline.

This material has never traded in a very high price band for a sustained period of time, but its current price is close to breaking through to the upside. Relative to the target group, significant quantities of this product are already trading on world markets. Still, cultivated material will become more prevalent and replace wild-harvest material in some markets.

Demand for this botanical should increase 20% to 30% annually over the next three-to-five years. Cultivated material will become more prevalent in the supply chain as prices increase 10% to 20 % annually over the same period. Overall supply will increase but not at a rate commensurate to demand growth. This factor should keep prices moving upward with moderate momentum.

5.3 Botanical Overview - Bloodroot (Sanguinaria canadensis)

Bloodroot is native to North America with a natural range covering most of the continent east of the Rocky Mountains. It is a perennial that grows at a rate of two-to-three inches a year to a mature height of about ten inches. It can grow in full sun but prefers semi-shaded, light-wooded areas with moist, acidic soil. The plant has a single, basal leaf that can be as wide as eight inches. The flower, located on a separate stalk, is white with a yellow center. Bloodroot is one of the first flowers to bloom beginning in late winter and continuing into early spring. The root is harvested in autumn, three or more years from seed. It must be stored in a low humidity environment, or it will quickly deteriorate and lose its medicinal value.

5.3.1 Bioactive Components - Bloodroot

The main bioactive components of Bloodroot are alkaloids, mainly sanguinarine. Others include chelerythrine, berberine and oxysanguinarine. Sanguinarine is an antiseptic and anti-inflammatory.

5.3.2 Uses and Treatments - Bloodroot

Bloodroot was a traditional medicine used by American Indians to treat fever and rheumatism. Modern medicine has found uses for Bloodroot as an anti-cancer agent, particularly for the treatment of skin cancer, and as a dissolving agent for skin growths such as warts. It has enjoyed some commercial success in toothpaste and mouthwash as an anti-plaque agent. Although not dangerous in prescribed amounts, an overdose of Bloodroot extract can cause vomiting and loss of consciousness. Germany's *Commission E*. has no recommended uses of Bloodroot at the current time. Table 5.3.2 lists the some of the modern and traditional uses of Bloodroot.

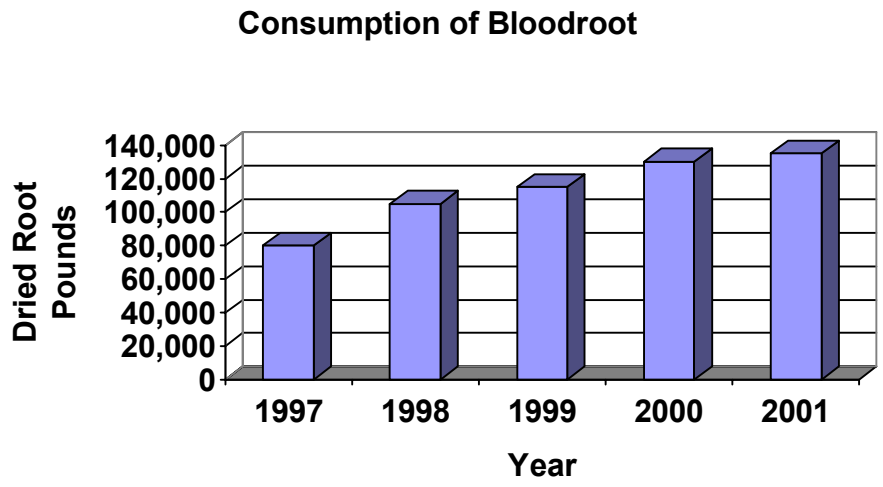
Table 5.3.2

Modern Uses	**Traditional/Folk Uses**
Promote coughing to clear mucus from respiratory tract	Treat fevers and rheumatism
Cancer treatment	Produce red, orange, pink dyes
Plaque inhibitor	Treat ulcers, ringworm, skin infections

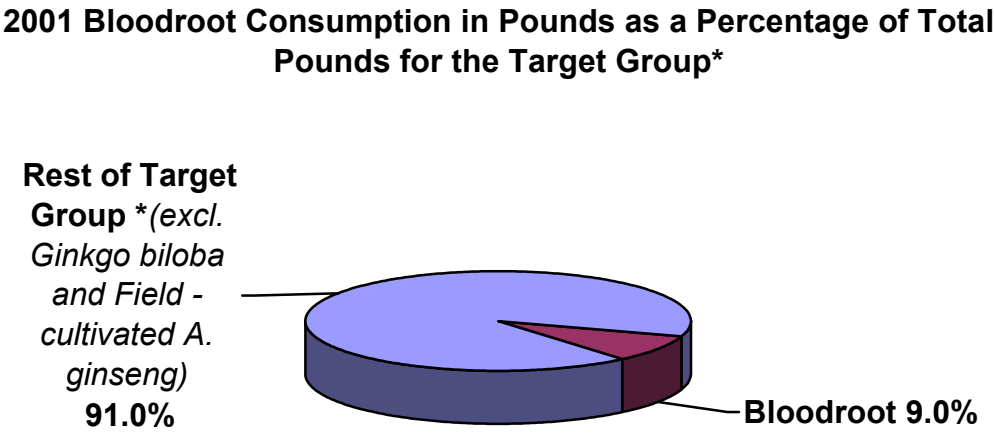
5.3.3 Market Overview - Bloodroot

5.3.3.1 Annual Consumption in Pounds - Bloodroot

Consumption of Bloodroot is moderate in terms of harvested pounds relative to the target group. Harvested pounds have continued to increase for this material but at a substantially lower rate than from 1997 to 1999. Consumption in 2001 was approximately 135,000 pounds, which was 3.8% higher than consumption in 2000.

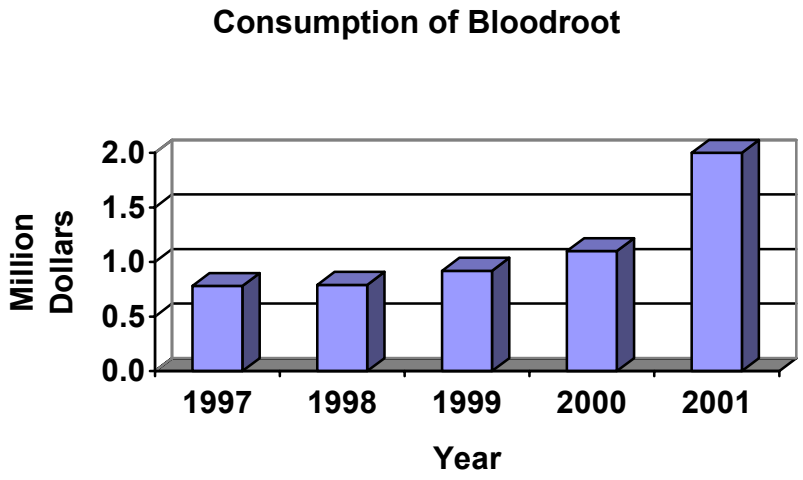


This amount represented 9.0% of the target group*, as seen below.

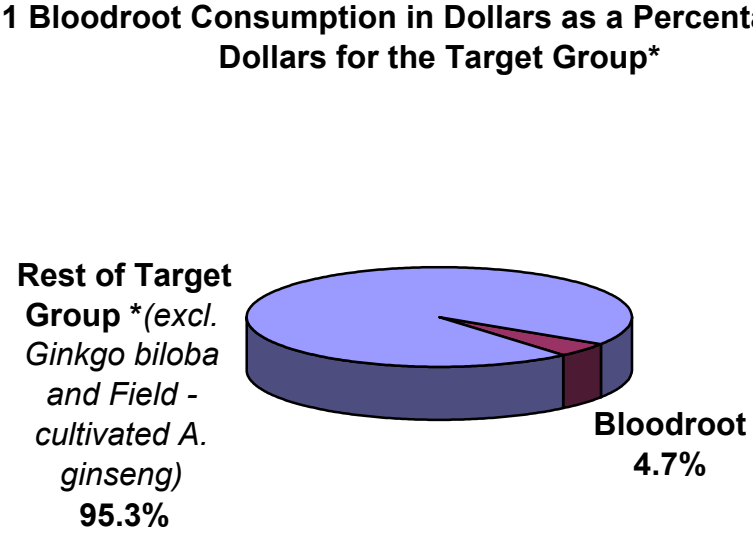


5.3.3.2 Dollar Value of Consumption - Bloodroot

Bloodroot trades in a moderate price band, $12 to $16 per pound, relative to the target group. The dollar value of this material has increased substantially in the last two years. A 3.8% increase in pound volume in 2001 was dwarfed by an 88% increase in dollar value in 2001, as compared to 2000.



This represented 4.7% of the target group* in 2001, as seen below.



5.3.4 Supply/Demand Balance - Bloodroot

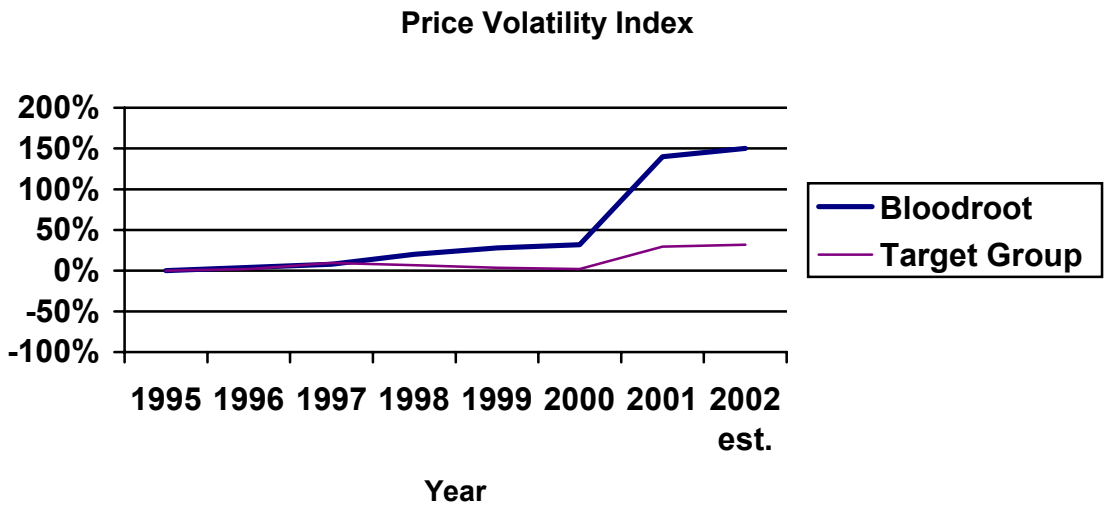
Demand currently exceeds supply for this botanical. From the mid-1990's until 2000, a steadily growing demand for this product has been satisfied exclusively by wild-harvest material. However, a surge in demand that began in the year 2000 continues to put pressure on naturally occurring populations.

5.3.5 Key Drivers of Demand Growth - Bloodroot

Increasing the use of this product's medicinal attributes is essential to its growth prospects. Unlike many other botanicals, additional demand for this material may come from agriculture. The cattle industry is exploring the use of this product as an ingredient in feed stocks. In 2001, almost all of worldwide harvest came from wild-harvest sources.

5.3.6 Price Volatility - Bloodroot

Prices for this botanical have traded in a low-to-moderate price band of $5-$9 for a pound of dried root from the mid-1990's up until the year 2000. A sharp increase in demand has shifted this material into a higher price band, and it currently trades from $12-$16 per pound.



5.3.7 Customer Concentration - Bloodroot

The majority of Bloodroot used for animal or human consumption is sold to European and Asian companies for processing. Other buyers are those using the plant for landscaping, gardening and other ornamental purposes.

5.3.8 Supplier Concentration - Bloodroot

Blood root is wild-harvested in North America by small producers located throughout its natural range, mostly along the Appalachian Range. Small pockets of cultivation can also be found in India.

Companies Associated with Bloodroot

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract/ Concentrate
R – Whole Root/ Herb

Advanced Labs	P	MiniStar International Inc.	E
Alfa Chem	P,E	Natural Herbs	P,R
Alpha Omega Labs	E	NHK Laboratories Inc.	P,E
Amitco International	P,E	Northwest Botanicals Inc.	P,C
Blue California	E	Phytobiotics GmbH – Germany	P,R
California Energy Nutriceuticals	P	Productos de Origen Natural SL	P
Chart Corp. Inc.	P,E	RIA International LLC	P,E
Ecuadorian Rainforest LLC	P,E	Ruger Chemical Co. Inc.	P,E,C
Energique Inc.	E	Scandinavian Formulas Inc	P,E
Falcon Trading International	P,E,C,R	Starwest Botanicals Inc.	P
FCC Products Inc.	P	To Your Health	P,E,C
Frontier Natural Products Cooperative	P	U.S. Nutraceuticals LLC	P,E
Gaia Herbs	E	Vitality Works Inc.	E
GCI Nutrients – Italy	P	Zhejiang Medicines & Health Products I/E Co. Ltd.	P,E,C
Gourmet Nutrition	E	Ridge Runner Trading	R
Kingchem Inc.	P,C	Botanicals International	R
Klickitat Organics			

5.3.9 Barriers to Entry - Bloodroot

Seed is not commercially available, and rootstock is very expensive. Little is known about how to cultivate this material on a large scale. Cultivation has mainly taken place on small, specialty plots where growing conditions are constantly altered to determine the best growing conditions for future large-scale cultivation.

5.3.10 Distribution Channels - Bloodroot

Distribution channels for this material are highly structured. Established brokers represent a small number of large customers.

5.3.11 Key Customer Requirements - Bloodroot

Most buyers have moderate expectations for a threshold level of sanguinarine and berberine. Since most of this material is wild harvest, customers are not concerned with organic certification as a prerequisite to buy.

5.3.12 Recent Developments - Bloodroot

The Commission of European Communities has stipulated that all synthetic antibiotic compounds incorporated into livestock feed as a way to fatten cattle must be removed by the end of 2005. This action was taken in response to scientific evidence that these synthetic antibiotics are transmitted to humans via meat consumption and makes humans more resistant to certain drugs. Bloodroot is currently being considered as an alternative ingredient to synthetic antibiotics in cattle feeds.

Berberine, an active constituent of Bloodroot, is showing promise in fighting brain tumors and many other cancers.

5.3.13 Commercial Visibility - Bloodroot

Sanguinarine has been used as an ingredient in toothpaste and mouthwash due to its properties as a plaque inhibitor. The best known of these products was Viadent toothpaste. Viadent stopped using Bloodroot in its formula in 2001. Alpha Omega Labs sells a product called "Bloodroot Paste" for the treatment of skin cancer and warts and also has a product called "Alpha Omega III Dentifrice" for the treatment of *gingivitis.* Of the major nutraceutical/botanical companies in North America and Europe, 15% offer Bloodroot as a stand-alone product, while 19% supply this material in a product that contains more than one active ingredient.

5.3.14 Suitability to North Carolina Cultivation - Bloodroot

Bloodroot does well in North Carolina, particularly in the western regions which are best suited for woods cultivation techniques. This material is native to North Carolina and is very familiar to the local population. Bloodroot is already cultivated in the state by nurseries for use in landscaping and gardens.

5.3.15 Overall Assessment - Bloodroot

Demand factors already in place will sustain this botanical in a moderate price band relative to the target group. Should any of the aforementioned new markets come to fruition, this material is poised for consistent, strong growth over the next three-to-five years.

Phytobiotics GmbH, a German animal feed manufacturer, is projecting that it will need between 250,000 pounds and 330,000 pounds of Bloodroot a year to meet its production schedule and is currently soliciting in the state for growers to meet its supply requirements. The quantity of material Phytobiotics estimates necessary for its production schedule is at least two times greater than the total 2001 Bloodroot harvest.

Core demand for this product will keep annual growth at about five-to-ten percent over the next three-to-five years. Any increase in supply from existing cultivated sources located in North America and India will be more

than offset by diminishing supplies of wild-harvest material. The combination of demand factors emanating from different markets, a lack of large-scale cultivation, diminishing natural populations, a current trading range of $12-$16 per pound and the possibility of a major demand surge in Europe makes this material an excellent candidate for cultivation.

5.4 Botanical Overview - False unicorn (Chamaelirium luteum)

False unicorn is native to North America with a natural range stretching from Florida north to New York and west to the Mississippi River. Most of the significant wild populations of this plant exist in the southern portion of its range. It is a herbacious perennial that grows approximately six-to-eight inches per year to a mature height of about two feet. False unicorn likes to grow in moist, acidic soil located in semi- to full-shaded areas in meadows, thickets and rich woods. It flowers from May to June and is harvested four-to-six years from seed for its roots. Harvest usually occurs in September after flowering has been completed.

5.4.1 Bioactive Components - False unicorn

The main bioactive components of False unicorn are a mixture of steroidal saponins, including chamaelirin and aglycone diosgenin. The effects of these bioactives include acting as an emmenagogue, diuretic and emetic.

5.4.2 Uses and Treatments - False unicorn

False unicorn is widely used by North American Indians as a "woman's herb". It was traditionally used to prevent miscarriage and has a reputation for improving fertility. In Western herbal medicine, False unicorn has been used to treat pregnancy problems and ovarian cysts. It has not been approved as a treatment option for any of the above-mentioned ailments by Germany's *Commission E*. Table 5.4.2 summarizes modern and traditional uses.

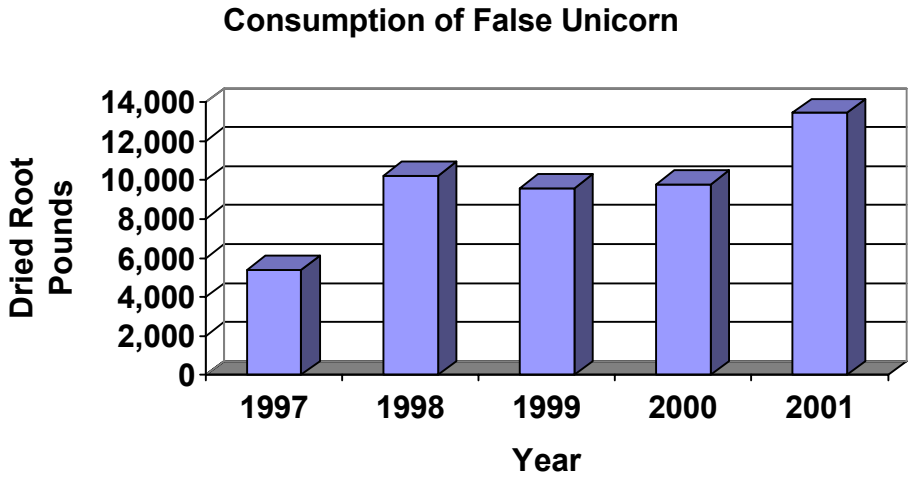
Table 5.4.2

Modern Uses	**Traditional/Folk Uses**
Anti-inflammatory	Menstrual problems
Diuretic	Pregnancy complaints
Treat ovarian cysts	Improve fertility

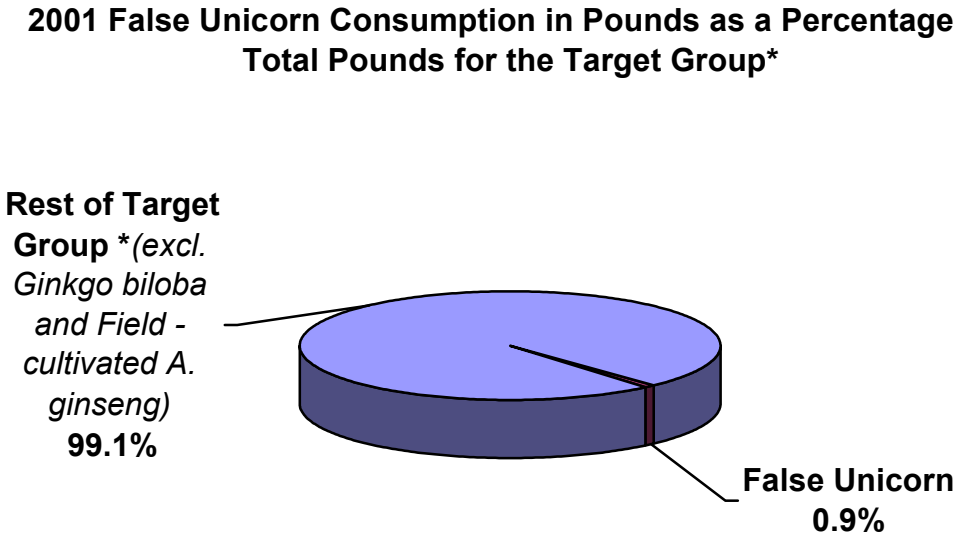
5.4.3 Market Overview - False unicorn

5.4.3.1 Annual Consumption in Pounds - False unicorn

Approximately 13,500 pounds of this material was consumed in 2001. All of the supply came from wild-harvest sources. As can be seen below, this consumption was almost 2 1/2 times the amount of material consumed in 1997 and a 37.2% increase from the year 2000.

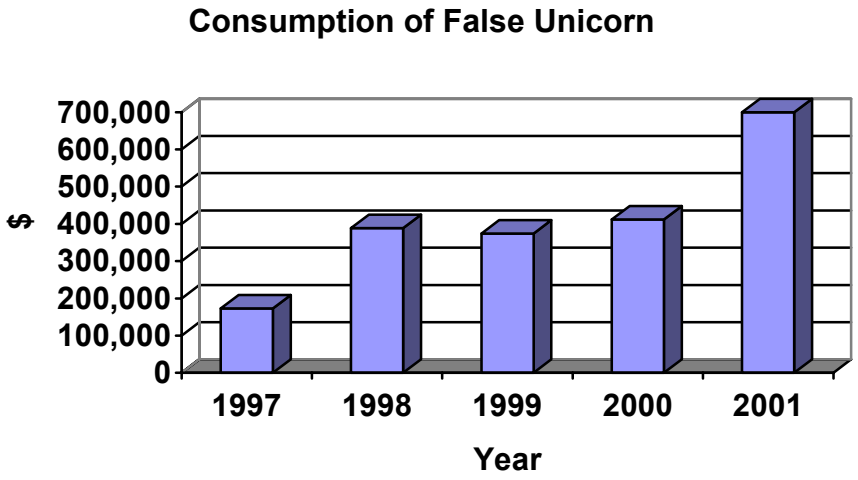


This consumption represented only 0.9% of the target group*, as seen below.

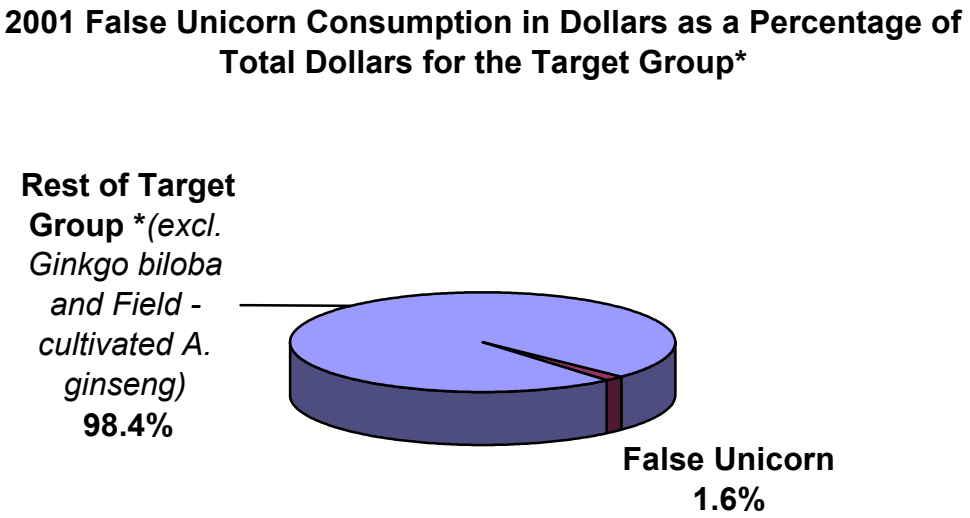


5.4.3.2 Dollar Value of Consumption - False unicorn

The dollar value of consumption for this material has increased from approximately $412,000 in 2000 to almost $700,000 in 2001.



This amount represents 1.6% of the target group* in 2001.



5.4.4 Supply/Demand Balance - False unicorn

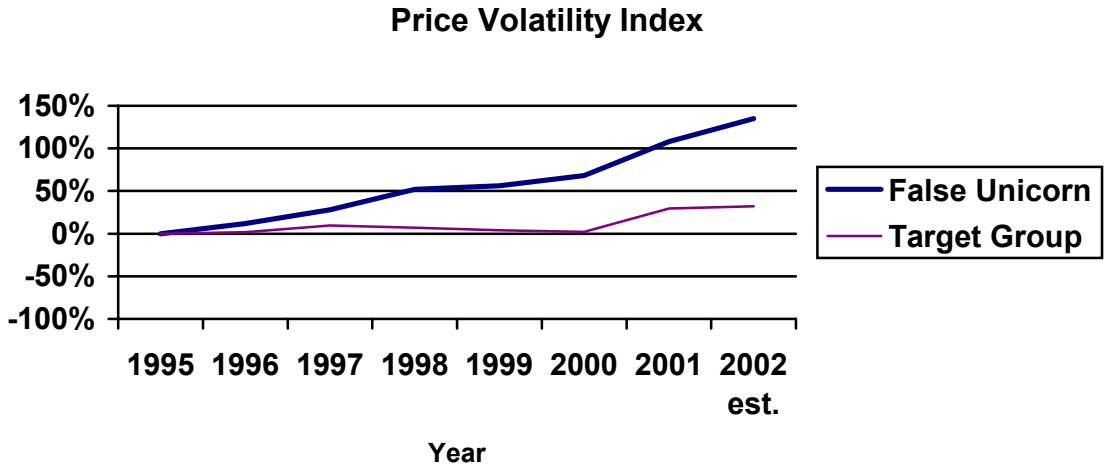
A moderate shortage has developed for this botanical. Demand continues to increase at a slow, but steady, rate. Supply of this material must be garnered exclusively from stagnant to declining wild populations. Although harvested pounds increased by over 37% from year 2000 levels, strains on the wild populations, particularly in the southeastern United States, are beginning to show. Harvest volumes above 15,000 pounds per year can only be consistently achieved with the incorporation of cultivated material into the supply channel.

5.4.5 Key Drivers of Demand Growth - False unicorn

Growth will be fueled by increased consumer acceptance, particularly among women, along with further integration into multi-herb products.

5.4.6 Price Volatility - False unicorn

From 1995 to 1999, this material traded in a range between $25 and $35 per pound. The 2000 harvest was comparable to those of the previous two years, but a small spike in demand drove prices higher by as much as 30% in some markets. Harvest volumes increased in 2001, which stabilized prices, but did not take them back to the trading range of the mid-to-late 1990's. In 2001, prices per dried root pound ranged from $40 - $50. Prices have remained 20% to 30% above the five-year trading range of this product.



5.4.7 Customer Concentration - False unicorn

Buyers of this material are widely dispersed throughout North America and Europe. All of these buyers represent very small interests with none controlling more than 5% of the market. Mainstream distributors and high-volume processors are reluctant to invest any significant amounts of capital into this botanical.

5.4.8 Supplier Concentration - False unicorn

Suppliers of False unicorn root are highly concentrated. Current supplies are wild-harvested on a very small-scale basis throughout the material's North American natural range, particularly in the southeastern United States.

Companies associated with False unicorn

P – Powder
E – Extract/ Concentrate
C – Use/ Produce Certified Organic Material
R – Whole Root/ Herb

Advanced Labs	P	Honson Ingredients Ltd.	E
American Botanicals	R	Juttner & Partner	P
American Ingredients	P	Kingchem Inc.	E
Amitco International	P,E	Mafco Natural Products	P
ASI International Inc.	P	Maypro Industries Inc.	P,E
B & K International/Famarco Ltd. Inc.	P	MediHerb Ltd	P,R
BattleChem Distribution Inc.	E	MiniStar International Inc.	E
BDS Natural Products	P	Nature's Cathedral	R
Bio-Botanica Inc.	E	Nature's Way	R,P
Blue California	E	Naturex Inc.- Brucia Plant Extracts	P
California Energy Nutriceuticals	P	NHK Laboratories Inc.	P,E
Chart Corp. Inc.	P,E	Quality Botanical Ingredients Inc.	P
Deyang Shutai Ginkgo Development Co.	P,E	RIA International LLC	P,E
Ecuadorian Rainforest LLC	P,E	Scandinavian Formulas Inc.	P,E
Energique Inc.	E	SPC Pharma Inc.	R
Falcon Trading International	P,E,C	Starwest Botanicals Inc.	P
FCC Products Inc.	P	Stryka Botanics	P
Gee Lawson Nutritional	P	To Your Health	P,E,C

Herbalist & Alchemist	R	U.S. Nutraceuticals LLC	P
Herbco International Inc.	P	Western Herb Products	P
		Whole Herb Co.	P,R
		Zhejiang Medicines & Health Products I/E Co. Ltd.	E

5.4.9 Barriers to Entry - False unicorn

Barriers to this market are high. Seed is not commercially available, and rootstock is very expensive. It can be grown from root divisions planted in the spring or fall; however, there has been very little research into the practicality of cultivating False unicorn commercially on a large scale. Long seed-to-harvest times of four-to-seven years make this material less attractive to growers without a contracted commitment from a buyer.

5.4.10 Distribution Channels - False unicorn

Experienced brokers and professionals are relied on to move all material through the supply chain. The market, in terms of pounds, is small relative to other botanicals in the target group. This fact, in combination with a lack of visibility relative to the target group, makes for a specialty market.

5.4.11 Key Customer Requirements - False unicorn

A moderate interest exists in high levels of bioactives. Most customers are more concerned with coloration, "feel" and the general appearance of the material. Many customers, fearing the exploitation of natural populations, are stipulating that material they purchase be supplied through cultivation or by sustainable wild-harvest techniques.

5.4.12 Recent Developments - False unicorn

False unicorn has been increasingly used in combination with other herbs in feminine remedies. A high price relative to most botanicals has spurned increased interest in this material as a candidate for cultivation. Growing support among conservation groups exist to petition CITES to evaluate False unicorn for inclusion in Appendix II.

5.4.13 Commercial Visibility - False unicorn

This material does not enjoy a great deal of visibility beyond a small core of botanical users and herbalists. Of the top manufacturers and distributors of nutraceuticals/botanicals in North America and Europe, 8% offer this material as a stand-alone product, and 11% offer this material as either a stand-alone product or as part of a multi-constituent supplement.

5.4.14 Suitability to North Carolina Cultivation - False unicorn

False unicorn is wellsuited for cultivation in North Carolina and will grow in the central regions of North Carolina using wild-simulated and woods-cultivated methods. To date, cultivation is only taking place on very small plots scattered throughout the plant's natural range.

5.4.15 Overall Assessment - False unicorn

This product has held up well in a high price band ($45 to $55 per pound of dried root). Although this market has been very strong and has demonstrated an ability to maintain its price level, any significant increase in cultivated material without a commensurate decrease in the volume of wild material makes this market vulnerable to over-supply and downward pricing pressures. The combination of decreasing wild-harvest supplies, due to a possible listing by CITES in Appendix II, and a lack of meaningful commercial cultivation in the pipeline makes this material a strong candidate for cultivation in North Carolina.

Demand for this botanical should remain flat over the next three-to-five years. Opportunities for cultivating this material will result from a decrease in the supply side of the equation. If the current price of this product is to be maintained, new sources of cultivated material should be employed to replace wild-harvest supplies rather than to meet higher expectations of demand.

5.5 Botanical Overview - Ginkgo (Ginkgo biloba)

The Ginkgo tree can be found all over the world. As one of the two oldest species of trees in existence today, Ginkgo trees have developed an amazing resistance to disease, pests and fire. They have also demonstrated quite a resistance to a more modern adversary - air pollution. Individual Ginkgo trees have been known to live as long as 1,000 years. The trees do not flower until they are 20 years to 30 years old. Male trees are planted for cultivation due to the fact that female trees produce a bad-smelling fruit.

The medicinal part of the tree, the leaves, is harvested on a yearly basis. The leaves are dried within twelve hours of harvest and pressed into balls. It is from these balls that Ginkgo extract is produced.

5.5.1 Bioactive Components - Gingko

The main bioactive components of Ginkgo leaves are flavinoids, biflavinoides, proanthocyanidins and triactonic diterpenes, which include the Ginkgolides A, B & C. Ginkgolide B has been shown to inhibit platelets in the blood from coagulating. The flavinoids in Ginkgo have demonstrated very strong antioxidant effects.

5.5.2 Uses and Treatments - Gingko

Ginkgo has been used for medicinal purposes for almost 5,000 years. In Chinese traditional medicine, it is used to treat asthma, bronchitis and various brain disorders. In Europe and North America, Ginkgo extract is used for the treatment of circulatory problems, immune system dysfunction and cognitive disorders, including memory loss.

There are currently no approved treatments involving the use of Ginkgo extracts in North America. However, the FDA regards Ginkgo extracts as "probably safe". Germany's C*ommission E.* has approved Ginkgo extract for the treatment of intermittent claudication, vascular vertigo and vascular tinnitus. Some of the treatment uses of Ginkgo are listed in Table 5.5.2.

Table 5.5.2

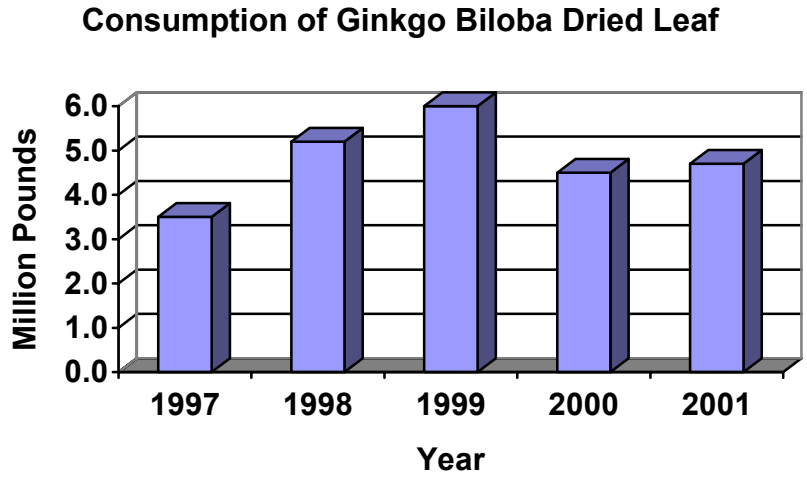
Modern Uses	**Traditional/Folk Uses**
Loss of cognitive ability	Brain disorders
Poor circulation	Asthma and bronchitis
Vision and hearing problems	Increase life span and sexual potency

Continued on Next Page

5.5.3 Market Overview - Gingko

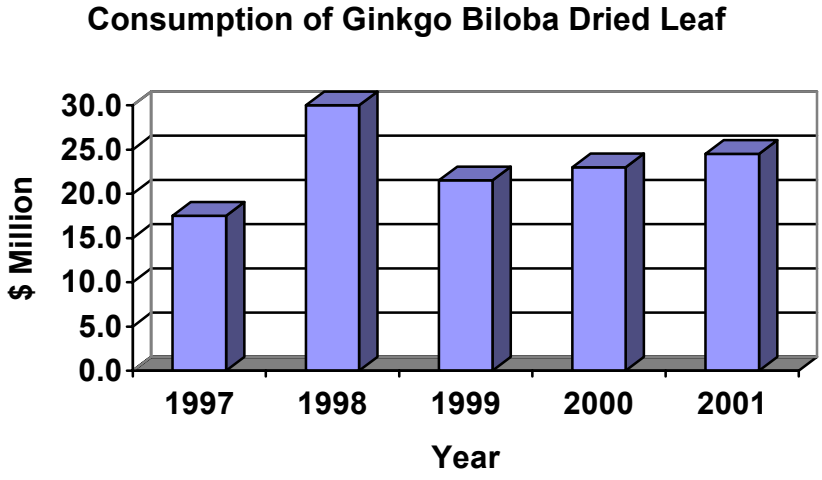
5.5.3.1 Annual Consumption in Pounds - Gingko

Between 4.5 million pounds and 5.1 million pounds of dried leaves were consumed in 2001. This amount was 34% higher than the 1997 consumption and about 5% higher than consumption in 2000.



5.5.3.2 Dollar Value of Consumption - Gingko

The dollar value of consumption in 2001 was about $25 million. It is 40% greater than the dollar value of consumption in 1997.



5.5.4 Supply/Demand Balance - Gingko

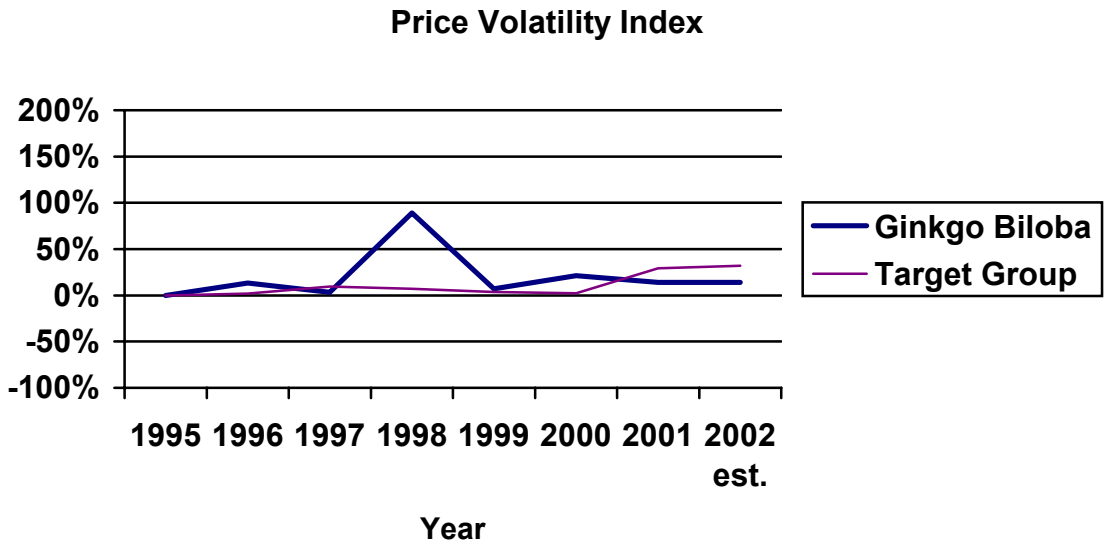
The balance is in equilibrium with a very stable market. Supplies of this material come exclusively from large-scale cultivation. Supply is very consistent and predictable, as is demand.

5.5.5 Key Drivers of Demand - Gingko

Historically positive clinical support continues to propel demand for this material. Ginkgo biloba is currently in clinical trials as a treatment option for Alzheimer's disease. An aging population base in North America and Europe has increased demand for this material with its anti-aging actions. European functional food manufacturers are incorporating this material into more nutritional supplements and beverages.

5.5.6 Price Volatility - Gingko

The price trades in a low, narrow price band. In 2001, prices for this material traded in a range of $4-$6 per pound of dried leaf. As an annual crop, 100% of the land dedicated to this material can be harvested every year, resulting in very predictable supplies. The large price spike that occurred in 1998 was quickly resolved by a rapid increase of supply.



5.5.7 Customer Concentration - Gingko

All size and type categories of processors and distributors are firmly entrenched. Most intermediate processing occurs in large, vertically integrated companies in Europe.

5.5.8 Supplier Concentration - Ginkgo

Large-scale cultivation is occurring worldwide. A small number of growers produce over 95% of the world's supply. Large commercial plantations exist in South Carolina (U.S.), Japan, Korea, France and China.

Companies Associated with Ginkgo biloba

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract/ Concentrate
L – Leaf

5-HTP Co. Ltd.	E,C	Furfural Espanol SA	L
A.M. Todd Company	E	GCI Nutrients	E
Aceto Corporation	E	Health4All Products Ltd.	P
ACTA Health Products	P	Infinity Industries	P,E
ADONISS Extraction	E	Infinity Marketing Group Inc.	P,E
Advanced Herbal Ingredient Inc.	E,C	Institut Rosell/Lallemand	E
Advanced Labs	P	Integrity Nutraceuticals International	E
AF Nutraceutical Group Inc.	E	IRMA Corp.	P,E,C
AHD International	P,E,C	Ji'an Natural Plant Extraction Factory	E
AIDP Inc.	E	Jiangsu Medicines & Health Products I/E Corp.	P,E,C
Alfa Chem	P,E	Jilin Province Hongjiu BioTech Co. Ltd.	E
AMAX NutraSource Inc.	E	Jinke Group USA Inc.	E
American Ingredients	P,E	Kingchem Inc.	E
Amitco International	P,E	Kirsch Pharma USA	P
Ampak Corp. Inc.	C	Klickitat Organics	P,E,C
AnMar International Ltd.	E	KR Natural Products	P

Arise & Shine Herbal Products Inc.	P	Kunshan Xing'an Co. Ltd.	E
Arkopharma	P,E	Linnea Inc.	E
Ashland Distribution Co.	P	Longstar International Inc./J & P Nutriceutical Services	P,E
ASI International Inc.	P,E	M & A Combine Ltd.	E
Asia Natural Products Inc.	P	Mafco Natural Products	P
Asiamerica International Inc.	P,E	Marcor Development Corp.	E
ATZ Natural - Div. of ATZ Chemical Inc.	E	Maruzen Pharmaceuticals Co. Ltd.	P,E
Ayush Herbs Inc.	E,L	Maypro Industries Inc.	P,E
B & D Nutritional Ingredients Inc.	E	Mayway Corp.	P,E
B & K International/Famarco Ltd. Inc.	P	MediHerb Ltd	E,L
Balchem Corp.	P	MiniStar International Inc.	E
Barrington Nutritionals - div. of Barrington Chemical Corp.	E	Morse Chemical Inc.	E
BattleChem Distribution Inc.	E	Motherland International Inc.	P,E
BDS Natural Products	P	MTC Industries Inc.	P,E
Beehive Botanicals Inc.	P	Natural Herbs	P,L
Beta Pure Foods Inc.	E,C	Natural Source International Inc.	E
BI Nutraceuticals	P,E	NaturalCare Inc.	E
Bio Serae	E	NatureGen Inc.	E
Bio-Botanica Inc.	E	Nature's Cathedral	L
Blue California	E,P	Naturex Inc. - Brucia Plant Extracts	E
Buckton Scott Nutrition Inc.	E	NHK Laboratories Inc.	P,E
California Energy Nutriceuticals	P	Novel Ingredient Services LLC	P,E
Canfo Natural Products Co. Ltd.	P,E,C	NuLiv Science Inc.	P,E
Charles Bowman & Co.	E	Nutra Products Inc.	P
Chart Corp. Inc.	P,E	Nutrichem Resources Co.	E
Chengdu Chemphys Chemical Industry Co. Ltd.	E	Nutrilife LLC (China)	P,E
Cherain Chemicals	P,E	NutriScience Innovations LLC	E
Chifeng Pharmaceutical	P,E	Omana Group LLC	E
China Herbs & Natural Products International Corp.	E	OptiPure Chemco Industries Inc.	E
China Jiangsu International Economic-Technical Coop. Corp.	P,E,C	Orcas International Inc.	P,E
China MEHECO Herbs I/E Corp.	P,E	P.L. Thomas & Co. Inc.	E
Chinese Herbal Ingredient Inc.	E,C	Pacific Botanicals	L,P,C
Chinese Natural Herbal Extracts Group Inc.	P,E,C	Pacific Rainbow International Inc.	E
Chongqing Carelife Pharmaceutical Co. Ltd.	E	Pharm East Inc.	E
Cognis Nutrition & Health	E	Pharmachem Laboratories Inc.	P,E
CPB International Inc.	E	Pharmline Inc.	P,E
Creative Compounds LLC	E	Pharmore Ingredients Inc.	E
Crystal Innovation International	E	Premium Ingredients Ltd.	P
Cyvex Nutrition	E	Pure World Botanicals Inc.	P,E
Dalian Tianshan Industrial Co. Ltd.	P,E	Qingdao Etsong Sun-Star Co. Ltd.	P,E
Dempsey Corp.	E	Qingdao FTZ Samin Trading Co. Ltd.	P,E

Deyang Shutai Ginkgo Development Co.	P,E	Quality Botanical Ingredients Inc.	P,E
DMH Ingredients Inc.	P	R.W. Greeff & Co.	P
DNP International Co. Inc.	E	Renaissance Herbs Inc.	E,L
Doingcom Chemicals Co. Ltd.	E	RFI Ingredients	P,E
DongAn Industrial Corp.	P,E	RIA International LLC	P,E
DOSIC	E	RMA Laboratories Inc.	E
Draco Natural Products	E	Ruger Chemical Co. Inc.	P,E,C
E.M. Sergeant Pulp & Chemical Co. Inc.	P	Sampac Enterprises	P,E
E.T. Horn Co.	E	Schwabe Group - Germany	P,E
East-West Imports	P,E,C	Scidoor Hi-Tech Biology Co. Ltd.	E
Ecuadorian Rainforest LLC	P,E	Seltzer Chemicals Inc.	E
Elixir International of New Mexico Inc.	E	Shandong Luye Pharmaceutical Co. Ltd.	P,E,C
Energique Inc.	E,C	Shanghai Freemen International Trading Co. Ltd.	P,E
Essential Wholesale	E,L	Shanghai Wenda Biotech Inc.	E
EUL International Herb Mfg. Inc.	P,E,C	Shree Vijeta Marketing	P,E,C
Euromed USA	E	Soft Gel Technologies Inc.	E
ExtractsPlus Inc.	E	Solgar	E
Exxentia	E	Source Connections LLC	E
Falcon Trading International	P,E,C	SPC Pharma Inc.	E
FCC Products Inc.	P	Starwest Botanicals Inc.	P,E
Fortune Bridge Co. Inc.	P,E	Stauber Performance Ingredients Inc.	P,E
Frutarom Inc.	P,E	STC International Inc.	E
Functional Foods Corp.	P,E	Stryka Botanics	P,E
Garuda International Inc.	E	Suan Farma Inc.	E
GCI Nutrients	E	Synergy Production Laboratories	P,C
Gee Lawson Nutritional	P,E	TCD China	E
Gencor Pacific Inc.	E	Technical Sourcing International	E
Global Marketing Associates Inc.	E	To Your Health	P,E,C
Gourmet Nutrition	P,E	Triarco Industries	P,E
Green Biochemicals Inc.	E	Scandinavian Formulas Inc.	P,E
GuiLin Natural Ingredients Inc.	E	Trusperity USA Inc.	E
H&A (Canada) Industrial Inc.	P	Unipharm Co. Ltd	E
Hainan Zhongxin Chemical Co. Ltd.	E	United Nutrition LLC	E
Harten Corp.	P,E	Vitality Works Inc.	E
Hathaway Allied Products Inc.	E	Vita-Pharm International Inc.	E
Hawk Biopharma	E	Wacker Biochem	P
Herb Trade Inc.	P,C,L	Watson Industries Inc.	E
Herbal Holistics International	P,E,C	Westco Fine Ingredients	E
Herbco International Inc.	P	Whole Herb Co.	P,E,L
Honson Ingredients Ltd.	P	Wonder Trading USA Inc.	P,E
Hunan Botanical Industrial Co. Ltd.	P,E,C	Wright Group, The	E
Hunan OSST Herb-Pharma Inc.	E	Xi'an Sanjiang Bio-Engineering Co. Ltd.	E
Indena USA Inc.	E	Xinguang Ind Prod I/E Corp.	E
Indo World Trading Corp.	P,E,L	Yantai Dongcheng Biochemicals Co. Ltd.	P

Ningbo Yinxian Foreign Trade Co. Ltd.	L	Zhejiang Medicines & Health Products I/E Co. Ltd.	E

5.5.9 Barriers to Entry - Gingko

It takes eight-to-ten years for a Ginkgo tree to mature to the point that it provides harvest value to a grower. As a result, a large opportunity cost is associated with cultivating Ginkgo relative to other crops.

5.5.10 Distribution Channels - Gingko

Distribution channels for this material are highly structured. The maturity of this market has resulted in all material flowing through large, vertically integrated companies. Most organizations are located in Europe and draw on imported raw material sources from all over the world.

5.5.11 Key Customer Requirements - Gingko

Since the supply of this botanical comes exclusively from cultivated sources, little variation exists in bioactive components among individual harvests. **Customers are primarily concerned with a lack of chemical residue on the material.** Typical bioactive percentages are 24% Ginkgo Flavoglycosides and 6% Terpene Lactones.

5.5.12 Recent Developments - Gingko

Large-scale cultivation continues to increase. China is planning to bring another 1,000 acres into production in the near future. A recent study concluded that there was no validity to claims that Ginkgo improves memory or related cognitive abilities. This question may finally be answered by a $15 million financed by the National Institutes of Health. The results of this study are not expected until 2006.

5.5.13 Commercial Visibility - Gingko

Ginkgo enjoys a great deal of visibility around the world. It is the main ingredient in a number of herbal products, including "Tanakan", "Tebonin" and "Rokin". The most well-defined extract of Ginkgo, Egb 761, is one of the top-five prescription medicines in Germany. It is available in the United Kingdom, the United States and Canada over the counter as a food supplement. In Asia, the seeds of the Ginkgo tree are used to aid digestion and reduce the intoxicating effects of alcohol. Of the top nutraceutical/botanical companies in North America and Europe, 51% offer Ginkgo as a stand-alone product and 78% offer this material as a stand-alone product or as part of a multi-constituent supplement.

5.5.14 Suitability to North Carolina Cultivation - Gingko

Ginkgo can be grown in the central regions of North Carolina. Sumter County, South Carolina, with a climate similar to many regions of North Carolina, is home to the largest Ginkgo biloba plantation in North America.

5.5.15 Overall Assessment - Gingko

The Ginkgo market is very mature compared to the rest of the target group. Increased capacity, already in various stages of readiness, appears able to absorb any new demand. The high profile of this material makes it very vulnerable to negative news, particularly in the less mature markets of North America. A study currently being conducted by the National Institutes for Health, due for release in 2006, will likely affect future growth prospects for this material.

This market will remain in a low growth environment (one-to-five percent annually) over the next three-to-five years. Supply is firmly entrenched and predictable. This factor will keep prices in a low, narrow band ($4-$7 per pound of dried leaf) over the same time period. Any increase in demand beyond expectations will be quickly satisfied by new cultivated sources ready to come online over the next five years.

5.6 Botanical Overview - Goldenseal (Hydrastis canadensis)

Goldenseal is native to North America with a natural range extending north to south from southern Quebec to northern Georgia and west as far as Missouri. Goldenseal is a herbaceous perennial that emerges in early spring, growing a new stem every year to a height of ten-to-twelve inches. It grows naturally in densely shaded deciduous forests but is more tolerant of less-shaded environments than Am. ginseng. Flowers occur briefly from late April to May, depending on location. They are followed in July by the production of a red berry containing up to 30 black seeds. The roots are harvested in autumn at about three-to-five years from seed. The roots are carefully cleaned and dried using forced-air under normal seasonal temperatures. The herb is also harvested and used for medicinal purposes.

5.6.1 Bioactive Components - Goldenseal

The main bioactive components of Goldenseal are the isoquinoline alkaloids hydrastine, berberine and canadine. Berberine has been shown to inhibit the growth of a number of parasites as well as killing tumors. Berberine is also linked to some sedative and antisecretory effects.

5.6.2 Uses and Treatments – Goldenseal

Native Americans use Goldenseal in a variety of ways, including as a general antiseptic and a treatment for snakebites. During the 1990's, Goldenseal enjoyed a re-birth among herbalists in the United States. This renewed interest has sparked new demand for this material in Europe. Modern medicinal uses for Goldenseal include the treatment of nasal congestion, digestive disorders and AIDS. Table 5.6.2 summarizes these and other uses. Goldenseal has not been endorsed as a treatment option by Germany's *Commission E*.

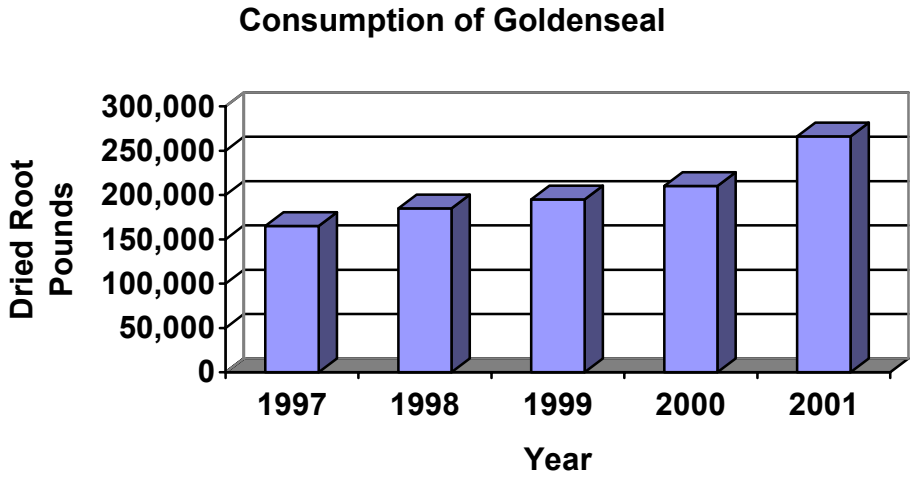
Table 5.6.2

Modern Uses	**Traditional/Folk Uses**
AIDS	Sore throat
Topical antiseptic	Mouth sores
Nasal congestion	General health tonic
Eye and ear infections	Snakebites

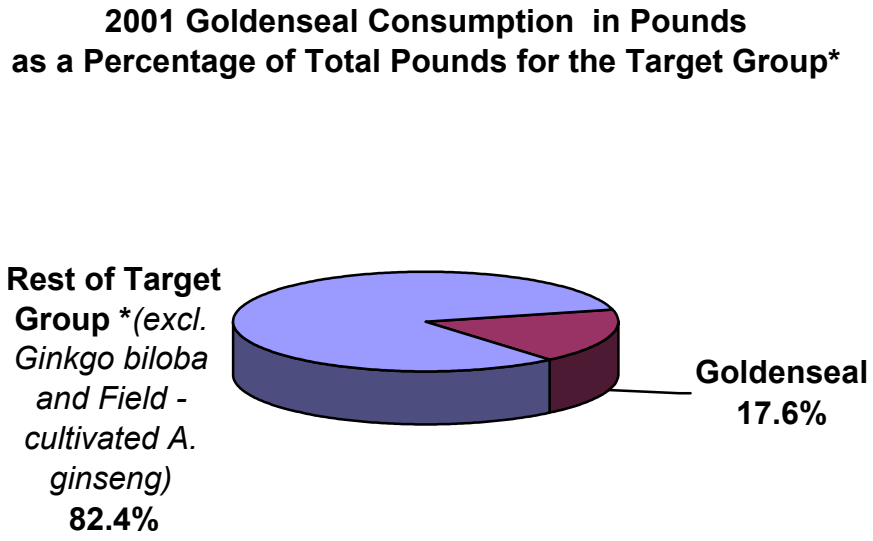
5.6.3 Market Overview - Goldenseal

5.6.3.1 Annual Consumption in Pounds - Goldenseal

In 2001, approximately 265,000 pounds of this material was sold on world markets. 1997 levels were just 165,000 pounds. 2001 levels were up about 27% from 2000.

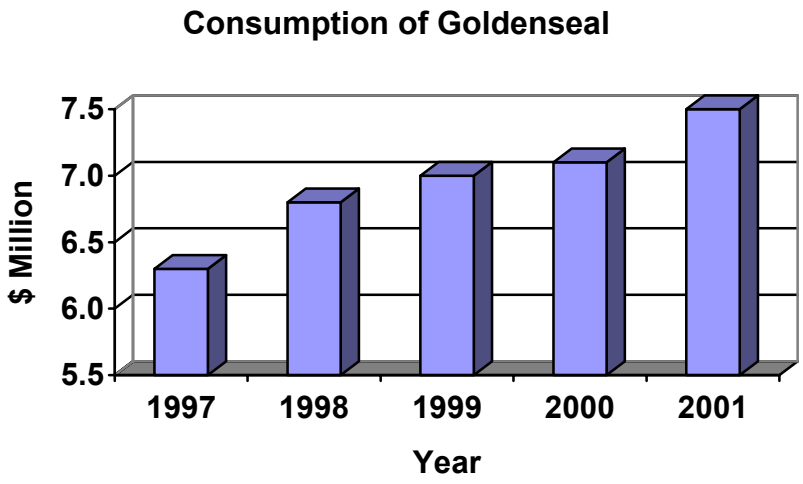


Goldenseal represents 17.6% of the target group* in 2001.

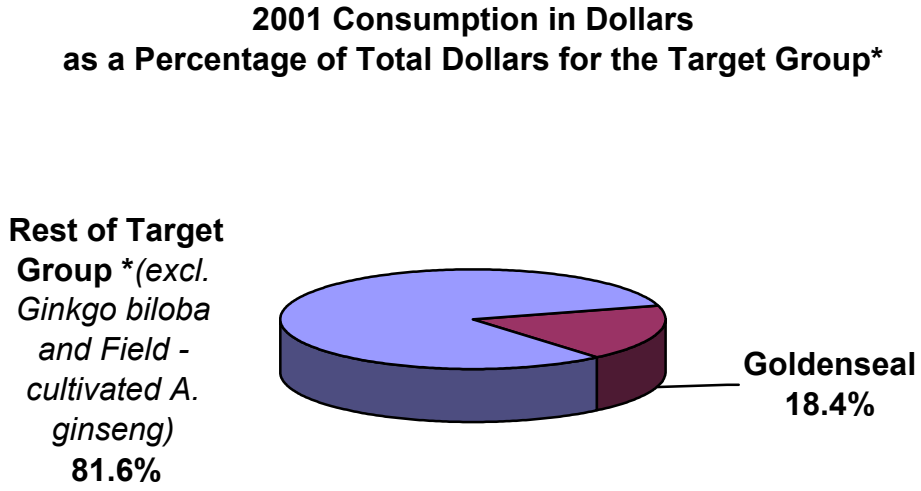


5.6.3.2 Dollar Value of Consumption - Goldenseal

Goldenseal trades in a high price band relative to the target group. In 2001, the dollar value of consumption was roughly $7.5 million. It is 6% higher than 2000 valuations. In 1997, the dollar value of consumption was about $6.3 million.



This amount represents 18.4% of the target group in 2001.



5.6.4 Supply/Demand Balance - Goldenseal

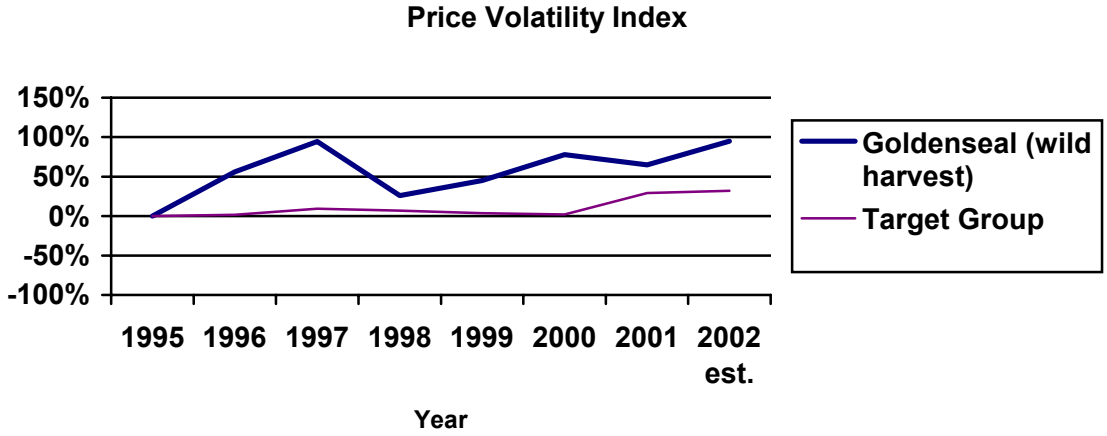
Supply and demand patterns are fragmented by customer requirements for this botanical. Demand currently exceeds supply for high-quality cultivated material. Wild-harvest product is currently meeting the demand requirements of buyers more concerned with the name recognition than bioactive components. Cultivated material represented about 25% of the overall supply in 2001.

5.6.5 Key Drivers of Demand - Goldenseal

Restrictions on wild harvesting and the desire for higher concentrations of bioactives continue to drive demand higher for high-quality cultivated material. Many manufacturers are incorporating Goldenseal into other herbal products in the belief that it enhances the potency of other herbs. A positive monograph from European health organizations, such as Germany's *Commission E*., would greatly enhance the marketability of this product in the European community.

5.6.6 Price Volatility - Goldenseal

Price for wild-harvest material fluctuates significantly from harvest season to harvest season. The price of cultivated product fluctuates less, but in a higher price band. In 2001, wild-harvest material traded in a range of $28-$30 per pound of dried root. High-quality, cultivated material traded in a range of $32-$38 per pound of dried root.



5.6.7 Customer Concentration - Goldenseal

Customer concentration in this market is highly fragmented. No single buyer controls more than 5% of the overall market.

5.6.8 Supplier Concentration - Goldenseal

Small-scale collectors, mostly in the southern regions of the Appalachian Range and Missouri, supply almost all of the wild-harvest product. No one supplier of wild-harvest material accounted for more 3% of the total wild-harvest supply in 2001. Cultivated sources are located mainly on small acreage plots in Canada, Wisconsin and the Pacific Northwest. Many growers of this botanical are members of co-ops or vertically integrated into large processors.

Companies Associated with Goldenseal

P – Powder
E – Extract
C – Use/ Produce Certified Organic Material
R – Whole Root/ Herb

5-HTP Co. Ltd.	E,C	Global Marketing Associates Inc.	E
A.M. Todd Company	E	Gourmet Nutrition	P
ACTA Health Products	P	Hathaway Allied Products Inc.	E
Advanced Herbal Ingredient Inc.	E,C	Infinity Industries	E
Advanced Labs	P	Infinity Marketing Group Inc.	P,E
AIDP Inc.	E	IRMA Corp.	P,E,C
Alchem International Ltd.	E	Klickitat Organics	P,E,C
AMAX NutraSource Inc.	E	KR Natural Products	P,E
American Botanicals	R	Longstar International Inc./J & P Nutriceutical Services	P,E
American Ingredients	P,E	Mafco Natural Products	P
Amitco International	P,E	Maui Medicinal Herbs Inc.	P,E,C
Arise & Shine Herbal Products Inc.	P	Maypro Industries Inc.	P,E
Ashland Distribution Co.	P	MediHerb Ltd.	R,P
ASI International Inc.	P	MiniStar International Inc.	E

Asiamerica International Inc.	P,E	Pharmline Inc.	P,E
ATZ Natural – Div. of ATZ Chemical Inc.	E	Pure World Botanicals Inc.	P,E
B & D Nutritional Ingredients Inc.	E	Quality Botanical Ingredients Inc.	P,E
B & K International/Famarco Ltd. Inc.	P	R.W. Greeff & Co.	P
BattleChem Distribution Inc.	E	RIA International LLC	P,E
BDS Natural Products	P,E	RMA Laboratories Inc.	E
Bella Vita Botanicals Inc.	R	Ruger Chemical Co. Inc.	P,E,C
Belmont Chemicals Inc.	P	Sampac Enterprises	P,E
BI Nutraceuticals – Div. Of Hauser	P,E	San Francisco Herb & Natural Food Co.	P,E
Bio-Botanica Inc.	E	Scandinavian Formulas Inc.	P,E
Blue California	E	Sinochem Shandong Import & Export Group Corp.	E
Botanicals International	R,E	Solgar	P,E
California Energy Nutriceuticals - C.E.N.	P	Soft Gel Technologies Inc.	E
Cape Cod Organics & Nutraceuticals Corp.	P,E,C,R	Source Connections LLC	E
Chart Corp. Inc.	P,E	Starwest Botanicals Inc.	P,E
China Herbs & Natural Products International Corp.	E	Stauber Performance Ingredients Inc.	P
Chinese Herbal Ingredient Inc.	E,C	STC International Inc.	E
Chinese Natural Herbal Extracts Group Inc.	P,E,C	Stryka Botanics	P,E
CPB International Inc.	E	Synergy Production Laboratories	P,C
Dempsey Corp.	E	TCD China	E
DNP International Co. Inc.	E	To Your Health	P,E,C
Doingcom Chemicals Co. Ltd.	E	Triarco Industries	P,E
East-West Imports	P,E,C,R	Trout Lake Farm	R
Ecuadorian Rainforest LLC	P,E	U.S. Nutraceuticals LLC	P,C
Energique Inc.	E	Unipharm Co. Ltd	E
Essential Wholesale	E,R	Vitality Works Inc.	E,C
EUL International Herb Mfg. Inc.	P,E,C	Watson Industries Inc.	P,E
Exxentia	E	Westco Fine Ingredients	E
Falcon Trading International	P,E,C	Whole Herb Co.	P,R
FCC Products Inc.	P	Wright Group, The	E
Flavine North America Inc.	P	Xinguang Ind Prod I/E Corp.	E
Fortune Bridge Co. Inc.	E	Zhejiang Medicines & Health Products I/E Co. Ltd.	E
Functional Foods Corp.	P	Strategic Sourcing/W.G.G. Inc.	R
GCI Nutrients	E		
Gee Lawson Nutritional	E		

5.6.9 Barriers to Entry - Goldenseal

Initial start-up costs per acre are high relative to the target group for the field cultivation of this material. Most cultivation currently comes from Am. ginseng growers rotating out of Am. ginseng production and into Goldenseal

production. Growing and harvesting techniques used for field-cultivated Am. ginseng can be directly transferred to Goldenseal production, drastically reducing the initial start-up costs of cultivating this material. Most Goldenseal currently cultivated, however, is propagated asexually, increasing start-up costs relative to the target group.

5.6.10 Distribution Channels - Goldenseal

Channels are specialized and rely on experienced Goldenseal brokers and professionals to bring small growers/collectors and buyers together. Wild-harvest material is handled through established general brokers that warehouse material and send it to large European processors who are not as particular about "quality" issues.

5.6.11 Key Customer Requirements - Goldenseal

High levels of total alkaloids in this material are of extreme importance to buyers in the North American market. Bioactive content of 3% Hydrastine and 6% total alkaloids is considered acceptable for most buyers.

5.6.12 Recent Developments - Goldenseal

Goldenseal has been the focus of a great deal of research regarding its effectiveness as an immune system stimulant. Overharvesting of naturally occurring populations has landed Goldenseal on the CITES list (Appendix 2). Canada and several U.S. states, including North Carolina, have placed severe restrictions on the harvest of wild populations.

5.6.13 Commercial Visibility - Goldenseal

Goldenseal has established a long track record of medicinal use in North America. Within the last ten years, interest in the European market has been steadily increasing as this material has been combined with more well-established herbs such as Echinacea(s) and Black cohosh. Of the top nutraceutical/botanical companies, 29% offer this material as a stand-alone

product and 51% offer this material as either a stand-alone product or as part of a multi-constituent supplement.

5.6.14 Suitability to North Carolina Cultivation - Goldenseal

The western portion of North Carolina is considered Goldenseal's prime natural range. This material tends to cultivate best in areas where it thrives in naturally. Goldenseal's popularity among herbalists and the presence of large natural populations of the plant in North Carolina have spawned a great deal of research exploring enhanced propagation and production techniques for this product. Dr. Jeannine Davis of North Carolina State University's Mountain Horticulture Crops Research & Extension Center has spearheaded research into the transplantation and sexual propagation of Goldenseal using independent plots. This strategy increases the quality of cultivated material, reducing harvest pressure on natural populations.

5.6.15 Overall Assessment - Goldenseal

Over the past ten years, the market for Goldenseal has demonstrated that it can support large volumes of harvested pounds and still maintain a high price level relative to the target group. As wild-harvest volumes continue to decline due to declining wild populations and a preference for high-quality, cultivated material increases, an excellent opportunity will present itself for various cultivation options.

Presently, most of the cultivated Goldenseal in the market is coming from a rotation into this material from Am. ginseng production. This cultivation is occurring outside Goldenseal's prime natural range under shade cloth. This situation creates a unique opportunity for North Carolina to use its superior natural resources to produce higher-quality, woods grown, cultivated material.

Over the next three-to-five years, the market for this material will grow at a rate of five-to-ten percent annually. The market demand for high-quality, cultivated material will grow at a faster rate, approaching 10% to 15% annually. Prices for high-quality, cultivated material will remain firm over the foreseeable future in the range of $35-$45 per pound of dried root.

Echinacea

There are nine different species of the genus *Echinacea Moench*. Three are currently used for medicinal purposes : *angustifolia, pallida and purpurea*.

5.7 Botannical Overview - Narrow-leaf Purple Coneflower (Echinacea angustifolia)

Narrow-leaf Purple Coneflower or *Echinacea angustifolia (E. angustifolia)* has a natural range in North America that includes most of the mid-western states east of the Rocky Mountains. It is an herbacious perennial that grows at a rate of 6 inches to 8 inches a year to a mature height of 20 inches to 28 inches, growing best on rocky plains and wide-open fields under full sunlight. The plant has one or more stems that are mostly unbranched and flowers from June to July. The root of cultivated E. angustifolia is harvested three-to-four years from seed. Wild-harvest material may not be collected until it has reached at least eight years from seed. Once harvested, it is dried in large containers at a temperature range of 85 degrees to 110 degrees Fahrenheit. Although the herb is also used medicinally, the root is believed to contain most of the plant's medicinal value.

5.7.1 Bioactive Components – Narrow-leaf Purple Coneflower

The main bioactive components of E. angustifolia are flavinoids, such as echinacoside and cynarin, alkamides such as dodeca-2E,4E-8Z, tetracetyl isobutylamide, and caffeic acid derivatives. Of the three species currently used in herbal treatments, E. angustifolia is regarded as the most chemically active possessing antibacterial, antiviral and antifungal properties.

5.7.2 Uses and Treatments – Narrow-leaf Purple Coneflower

E. angustifolia has a long tradition of use among the native people of North America. It was, and continues to be, the most widely used herbal remedy in the native cultures. In modern cultures of North America and Europe, E. angustifolia is primarily used in medicines believed to boost the immune system. Germany's *Commission E.* does not endorse E. angustifolia

for use in any treatment. However, a great deal of dispute exists as to whether E. angustifolia was properly evaluated in many European studies. Cross hybridization of the genus may have contaminated much of the research used as the basis for the recommendations made by the commission. Table 5.7.2 summarizes the treatment uses of E. angustifolia.

Table 5.7.2

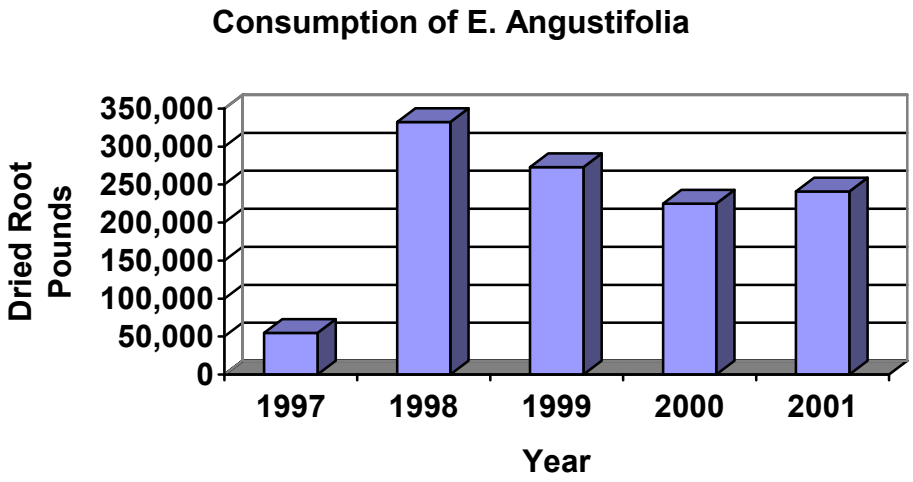
Modern Uses	**Traditional/Folk Uses**
Stimulate the immune system	Blood poisoning
Antibacterial agent	Fevers
	Acne
	Infections and sores

Continued on Next Page

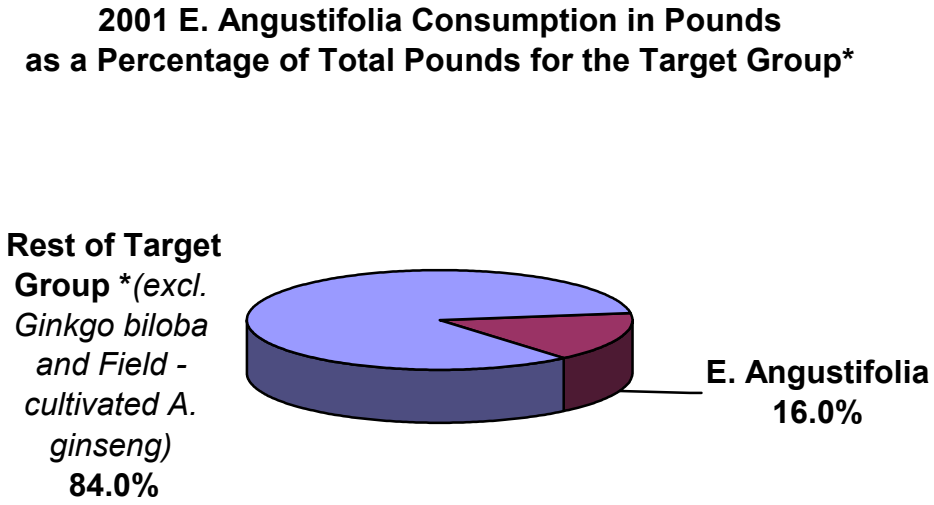
5.7.3 Market Overview – Narrow-leaf Purple Coneflower

5.7.3.1 Annual Consumption in Pounds – Narrow-leaf Purple Coneflower

In 1997, about 55,000 pounds of this material was sold on world markets. Consumption increased to almost 241,000 pounds in 2001.

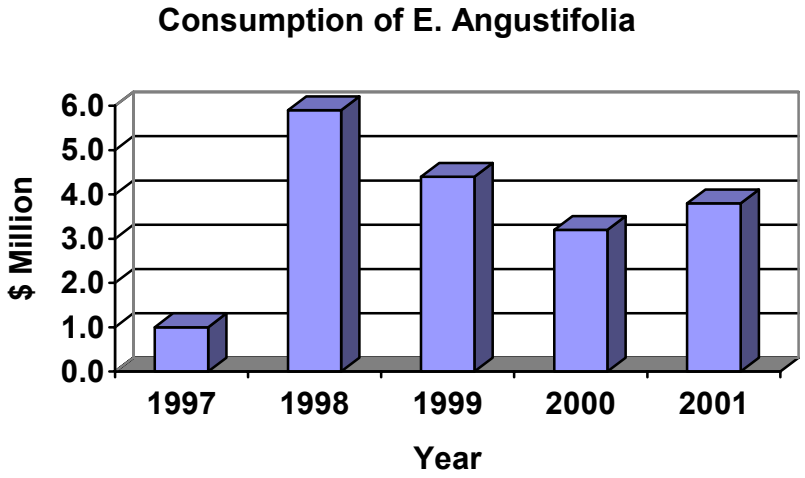


This amount represented 16% of the target group* in 2001.

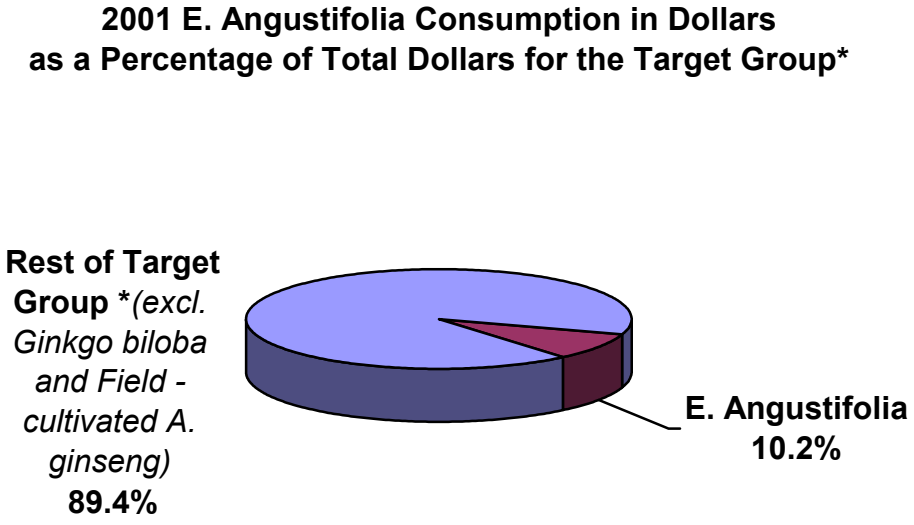


5.7.3.2 Dollar Value of Consumption – Narrow-leaf Purple Coneflower

The dollar value of consumption in 2001 was almost $3.8 million, which is 20.6 % higher than the value of consumption in 2000. In 1997, consumption was valued at $1.1 million.



This amount represents 10.2% of the target group* in 2001.



5.7.4 Supply/Demand Balance – Narrow-leaf Purple Coneflower

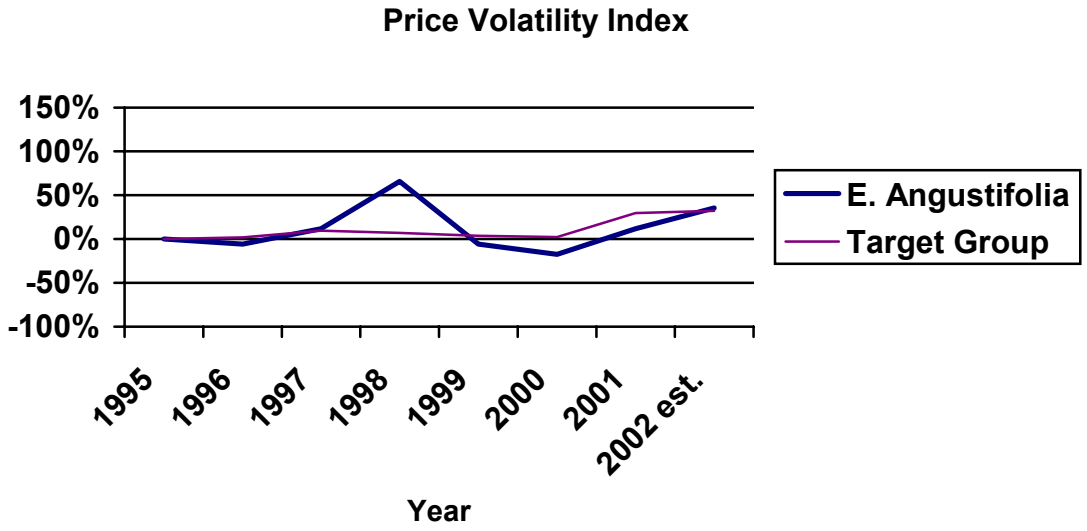
A shortage of high-quality, wild-harvest material currently exists. The current supply of cultivated product is low in bioactives and not desired by the major players in the industry. Improper harvest and storage protocols, particularly in the case of wild-harvest material, greatly diminish its bioactive content.

5.7.5 Key Drivers of Demand Growth – Narrow-leaf Purple Coneflower

Wider acceptance in the European markets is essential to the long-term growth prospects of this botanical. Clinical support of the medicinal uses for echinacosides would help this material differentiate itself from E. purpurea, which does not contain the same bioactive components. **Demand for cultivated product is contingent on its ability to deliver the same bioactive content as wild-harvest material.**

5.7.6 Price Volatility – Narrow-leaf Purple Coneflower

During 2001, the price of cultivated material traded in the range of $14-$16 per pound of dried root, which is 15% to 20% lower than high-quality, wild-harvest material. Currently, prices have stabilized in a moderate-to-high price band ($16-$20 per pound of dried root) relative to the target group after an increase of 20% in the spring/summer of 2002. High-quality, wild-harvest product still trades in a higher, but more erratic, price range due to the low volumes of available product and inconsistent harvest cycles.



5.7.7 Customer Concentration – Narrow-leaf Purple Coneflower

Many medium-to-large buyers are not interested in paying a premium price for this material as it compares to E. purpurea, since they do not differentiate the species from the genus in the advertising of their Echinacea products. However, a few, relatively large buyers, are trying to build product differentiation by endorsing E. angustifolia as superior to E. purpurea. Smaller concerns are not willing to pay for expensive testing procedures to verify the type of Echinacea they are buying.

5.7.8 Supplier Concentration – Narrow-leaf Purple Coneflower

Suppliers of wild-harvest material are located throughout the plant's natural range, particularly in the mid-western United States. A small quantity of wild product also emanates from Canada. Cultivation is currently occurring in the United States, Canada, Australia, New Zealand, Chile and Costa Rica.

Companies associated with E. angustifolia

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract
R – Whole Root/ Herb

5-HTP Co. Ltd.	E,C	Indena Inc.	E
Alticor - Nutrilite	E,C	Indo World Trading Corp.	R,E
A.M. Todd Co., The	E	Infinity Industries	E
ACTA Health Products	R	IRMA Corp.	R,E,C
ADONISS Extraction	E	Jacobs Farm/Del Cabo Inc.	R,C
Advanced Herbal Ingredient Inc.	E,C	K.-W. Pfannenschmidt GmbH	R
Advanced Labs	R	Kingchem Inc.	E
AF Nutraceutical Group Inc.	E	Klickitat Organics	R,E,C
AHD International	R,E,C	Linnea Inc.	E
AIDP Inc.	E	Longstar International Inc./J & P Nutriceutical Services	R,E
Alchem International Ltd.	E	Market New Zealand Ltd.	R,E,C
Alfa Chem	R,E	Maui Medicinal Herbs Inc.	R,E,C

AMAX NutraSource Inc.	R,E	Maypro Industries Inc.	R,E
American Ingredients	R,E	Mehta Pharmaceuticals Pvt. Ltd.	E
Amitco International	R,E	MiniStar International Inc.	E
Amrita Aromatherapy	E	Modern Natural Products	R,E,C
AnMar International Ltd.	E	Monteloeder SL	E
Arkopharma	R	Morse Chemical Inc.	R
Arrow Chemical Inc.	E	Natural Source International Inc.	E
ASI International Inc.	R,E	Nature's Cathedral	R
Asiamerica International Inc.	R,E	Nature's Way	R,P
ATZ Natural	E	Nature*4*Science	E
Avoca	R	Naturex Inc.- Brucia Plant Extracts	E
Ayush Herbs Inc.	E	NHK Laboratories Inc.	R,E
B & D Nutritional Ingredients Inc.	E	Northwest Botanicals Inc.	R,C
B & K International/Famarco Ltd. Inc.	R	Novel Ingredient Services LLC	R,E
BattleChem Distribution Inc.	E,C	Nutrilife LLC (China)	E
BDS Natural Products	R,E,C	NutriScience Innovations LLC	R,E
Belmont Chemicals Inc.	R	Nutura Internacional s.l.	E
Blessed Herbs Inc.	R	Omana Group LLC	E
BI Nutraceuticals	R,E	OptiPure Chemco Industries Inc.	E
Bio-Botanica Inc.	E	Orcas International Inc.	R,E
Blue California	E	P.L. Thomas & Co. Inc.	R,E
Buckton Scott Nutrition Inc.	R,E	Pacific Botanicals	R,C
California Energy Nutriceuticals	R	Pacific Rainbow International Inc.	E
Cape Cod Organics & Nutraceuticals Corp.	R,E,C	Pharmachem Laboratories Inc.	R,E
Chart Corp. Inc.	R,E	Pharmline Inc.	R,E
Cherain Chemicals	R,E	Plantation Medicinals	R
China MEHECO Herbs I/E Corp.	E	Qingdao FTZ Samin Trading Co. Ltd.	E
Chinese Herbal Ingredient Inc.	E,C	Quality Botanical Ingredients Inc.	R,E
Chinese Natural Herbal Extracts Group Inc.	R,E	Renaissance Herbs Inc.	E
Cognis Nutrition & Health	E	RFI Ingredients	R,E
CPB International Inc.	E	RIA International LLC	R,E
Crystal Innovation International	E	Ricera American Corp.	R,E
Crystals International Inc.	R	RMA Laboratories Inc.	E
Dalian Tianshan Industrial Co. Ltd.	R,E	San Francisco Herb & Natural Food Co.	R,E
Dempsey Corp.	E	Scidoor Hi-Tech Biology Co. Ltd.	E
Desert Herb Co. Inc.	R,C	Shandong Luye Pharmaceutical Co. Ltd.	R,E
Deyang Shutai Ginkgo Development Co.	R,E	Shanghai Freemen International Trading Co. Ltd.	R,E
DNP International Co. Inc.	E	Shanghai Wenda Biotech Inc.	E
Doingcom Chemicals Co. Ltd.	E	Soft Gel Technologies Inc.	E
DongAn Industrial Corp.	R,E	Source Connections LLC	E
E.M. Sergeant Pulp & Chemical Co. Inc.	R,E	Starwest Botanicals Inc.	R,E,C
East-West Imports	R,E	Stauber Performance Ingredients Inc.	R,E
Ecuadorian Rainforest LLC	R,E	STC International Inc.	E
Elixir International of New Mexico Inc.	R	Stryka Botanics	R,E
Energique Inc.	E,C	Suan Farma Inc.	E
Essential Wholesale	E	Strategic Sourcing Inc.	R

EUL International Herb Mfg. Inc.	R	TCD China	E
Euromed USA	E	Technical Sourcing International	E
ExtractsPlus Inc.	E	To Your Health	R,E,C
Exxentia	E	Triarco Industries	R,E
Falcon Trading International	R,E,C	Trout Lake Farm LLC	R,E,C
FCC Products Inc.	R	U.S. Nutraceuticals LLC	R,C
Flavine North America Inc.	R	Unipharm Co. Ltd	E
Fortune Bridge Co. Inc.	R,E	United Nutrition LLC	E
Functional Foods Corp.	R,E	Van Drunen Farms	R,C
Furfural Espanol SA	E	Vitality Works Inc.	E,C
GCI Nutrients - Italy	R,E	Vita-Pharm International Inc.	R,E
Gee Lawson Nutritional	R,E	Watson Industries Inc.	E
Gencor Pacific Inc.	E	Westco Fine Ingredients	E
Global Marketing Associates Inc.	E	Whole Herb Co.	R,E
Gourmet Nutrition	R,E,C	Wonder Trading USA Inc.	R,E
Green Biochemicals Inc.	E	Wright Group, The	E
GuiLin Natural Ingredients Inc.	E	Xinguang Ind Prod I/E Corp.	E
Hainan Zhongxin Chemical Co. Ltd.	E	Zhejiang Medicines & Health Products I/E Co. Ltd.	E
Hawk Biopharma	E	Zhejiang Orient Tea Development Co. Ltd.	R,E,C
Health Brands Inc.	R,E		
Herb Trade Inc.	R,C		
Herbco International Inc.	R		

5.7.9 Barriers to Entry – Narrow-leaf Purple Coneflower

E. angustifolia will grow under normal row crop procedures provided soil conditions are adequate. However, seed costs are very high in relation to other botanicals in the target group. A great deal of knowledge is required to successfully cultivate this strain. If growing conditions are not ideal for the production of high bioactives, the market value of the crop will be adversely affected. Weed control is a major issue when cultivating any strain of Echinacea. Poor weed control will lead to a significant reduction in yields.

5.7.10 Distribution Channels - Narrow-leaf Purple Coneflower

Some growers have become integrated with larger producers, but many small growers and gatherers are still moving material through brokers and specialized sourcing companies.

5.7.11 Key Customer Requirements - Narrow-leaf Purple Coneflower

Levels of echinacosides between 1.8% and 2.8% are required by buyers paying a premium price for this material.

5.7.12 Recent Developments – Narrow-leaf Purple Coneflower

This product continues to gain market share in European and Asian markets as manufacturers add it to their product lines. Overharvesting in several western states has led to bans and severe restrictions on the collection of natural E. angustifolia populations.

Indena SpA, a manufacturer of botanical extracts located in Italy, announced in December of 2002 the launch of a new product containing E. angustifolia called "Polinacea". This product is manufactured through the use of the company's new extraction process and marketed as an immunological response modulator.

5.7.13 Commercial Visibility – Narrow-leaf Purple Coneflower

Of the top nutraceutical/botanical companies in North America and Europe, 25% offer this material as a stand-alone product and 51% offer this material as either a stand-alone product or as part of a multi-ingredient supplement.

5.7.14 Suitability to North Carolina Cultivation – Narrow-leaf Purple Coneflower

E. angustifolia can be grown in eastern regions of North Carolina but is not native to the region. Cooperative efforts among growers and agricultural institutions in North Carolina could yield the high-quality, cultivated material required by major buyers.

5.7.15 Overall Assessment – Narrow-leaf Purple Coneflower

E. angustifolia trades at a substantial premium to E. purpurea and in a moderate-to-high price band relative to the target group. Customer requirements and expectations for a threshold level of bioactives are vital to this material's viability as a candidate for cultivation. Opportunities may be more prevalent in the mid-western region of the United States for field cultivation than in North Carolina at this time. However, the advantages the Midwest has, in terms of climate and soil conditions, have yet to generate consistent, high-quality cultivated material. This leaves the door wide open for cultivation efforts in North Carolina.

The market for this botanical is expected to grow at a rate of between 10% and 20% over the next three-to-five years. Most of the growth in this market will be for high-quality material from wild-harvest and cultivated sources. Supply will remain flat for this product as growers of cultivated material struggle to improve the quality of their crops. Prices will remain high, relative to the target group, ranging from $16-$21 per pound over the next 12 months.

5.8 Botanical Overview - Pale Purple Coneflower (Echinacea pallida)

Pale Purple Coneflower or *Echinacea pallida (E. pallida)* has a natural range that is primarily located on the prairies and glades of the mid-western states east of the Rocky Mountains. It is an herbaceous perennial that grows at a rate of 10 inches to 14 inches a year to a mature height of 3 feet to 3 1/2 feet. E. pallida is in flower from August to September and requires moist soil and full sunlight to flourish. Harvesting, drying and storage methods are the same as E. angustifolia.

5.8.1 Bioactive Components – Pale Purple Coneflower

The bioactive compounds in E. pallida are very similar to E. angustifolia except this material is commonly believed to contain higher levels of echinacosides than E. angustifolia.

5.8.2 Uses and Treatments – Pale Purple Coneflower

Like E. angustifola, E. pallida was and still is used by the native peoples of North America to treat a variety of ailments. In Germany, E. pallida is more widely accepted than it is among the modern cultures in North America and the rest of Europe. Germany's *Commission E.* recommends E. pallida for fevers and colds. Table 5.8.2 summarizes E. pallida's uses.

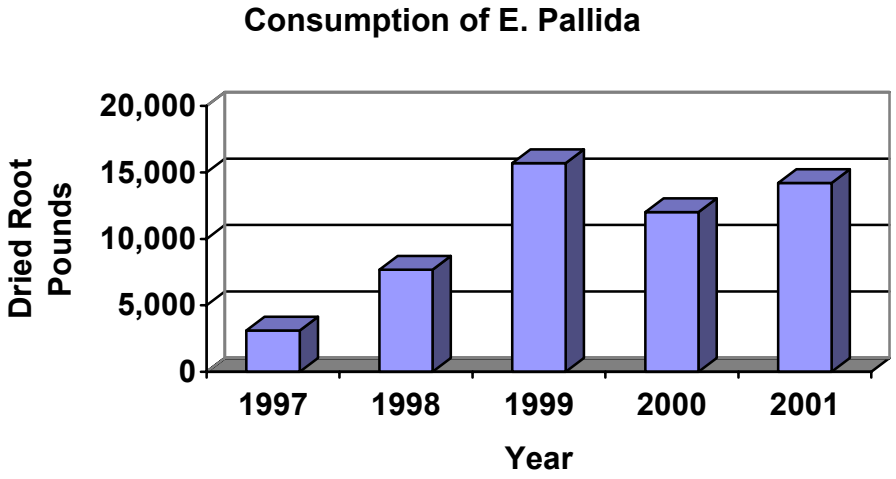
Table 5.8.2

Modern Uses	**Traditional/Folk Uses**
Fevers and colds	Snake bites
Boosts the immune system	Food poisoning
	Sore throat and mouth sores

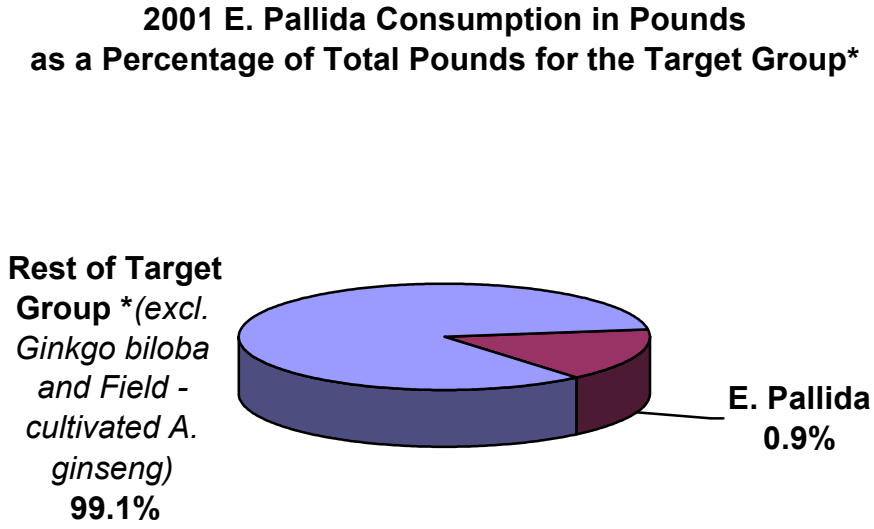
5.8.3 Market Overview – Pale Purple Coneflower

5.8.3.1 Annual Consumption in Pounds – Pale Purple Coneflower

The size of the market in terms of harvested pounds is small relative to the target group*. In 2001, only 14,000 pounds to 15,000 pounds of dried root was sold on world markets. This was almost four times the amount sold in 1997.

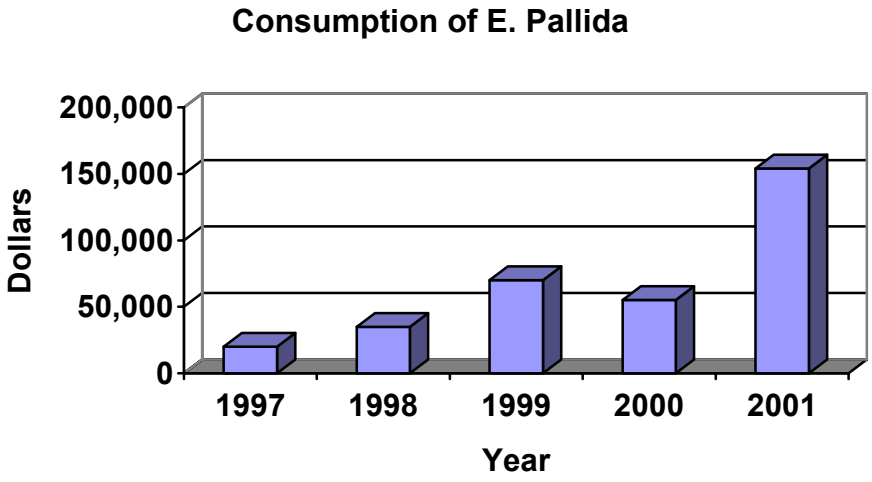


E. pallida represents only 0.9% of the harvested pounds of the target group* in 2001.

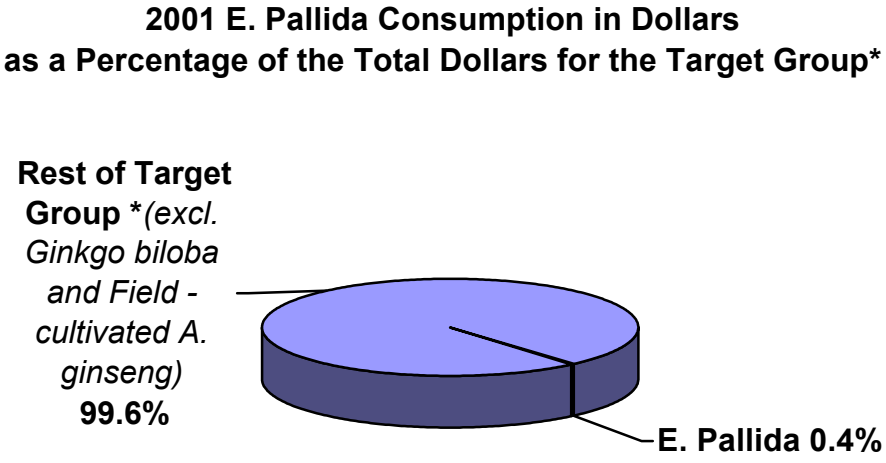


5.8.3.2 Dollar Value of Consumption

The dollar value of consumption in 2001 was approximately $150,000. This amount is over seven times the value of the 1997 consumption for this material.



This amount represents only 0.4% of the dollar value for the target group* in 2001.



5.8.4 Supply/Demand Balance – Pale Purple Coneflower

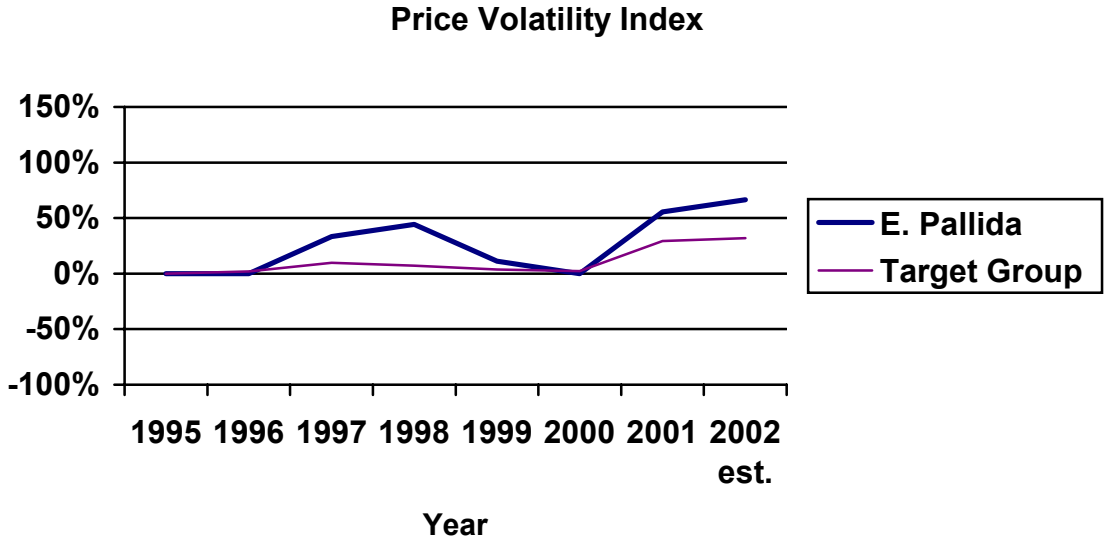
Very few forces are exerting themselves consistently on either the supply or demand side of the equation for this botanical. Buyers are not overly committed to this material and lack any real conviction to bid up prices.

5.8.5 Key Drivers of Demand – Pale Purple Coneflower

E. pallida needs positive differentiation from other Echinacea strains. This material must be able to differentiate itself in clinical trials from other species in the genus, particularly E. angustifolia, to succeed commercially.

5.8.6 Price Volatility – Pale Purple Coneflower

The lack of liquidity in this market makes it very susceptible to large price fluctuations with only modest changes in supply or demand. In 2001, prices traded in the $7-$14 range.



5.8.7 Customer Concentration – Pale Purple Coneflower

Buyers are located worldwide for this material but generally represent very low-volume interests.

5.8.8 Supplier Concentration – Pale Purple Coneflower

Small acreage growers and collectors are dispersed throughout North America. Cultivation is also taking place in South America on a very small scale.

Companies Associated with E. pallida

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract
R – Whole Root/ Herb

ADONISS Extraction	E	Furfural Espanol SA	R
Advanced Herbal Ingredient Inc.	E,C	Flavine North America Inc.	R
Advanced Labs	R	Herbalist & Alchemist	R
AF Nutraceutical Group Inc.	E	Indena USA Inc.	E
AHD International	R,E,C	Novel Ingredient Services LLC	R,E
AIDP Inc.	E	Pacific Rainbow International Inc.	E
Alchem International Ltd.	E	Pharmline Inc.	R,E
Alfa Chem	R,E	Qingdao Etsong Sun-Star Co. Ltd.	E
AMAX NutraSource Inc.	R,E	Qingdao FTZ Samin Trading Co. Ltd.	E
American Botanicals	R	Quality Botanical Ingredients Inc.	R,E
Ayush Herbs Inc.	E	Renaissance Herbs Inc.	E
B & D Nutritional Ingredients Inc.	E	RFI Ingredients	R,E
BI Nutraceuticals	R,E	RIA International LLC	R,E
Bio-Botanica Inc.	E	Ricera American Corp.	R,E
Blue California	E	RMA Laboratories Inc.	E
Cape Cod Organics & Nutraceuticals Corp.	R,E,C	San Francisco Herb & Natural Food Co.	R,E

Chart Corp. Inc.	R,E	Starwest Botanicals Inc.	R,E,C
Ecuadorian Rainforest LLC	R,E	To Your Health	R,E,C
Elixir International of New Mexico Inc.	E	Triarco Industries	R,E
Energique Inc.	E,C	Trout Lake Farm LLC	R,E,C,R
Essential Wholesale	E	U.S. Nutraceuticals LLC	R,C,E
EUL International Herb Mfg. Inc.	R	Whole Herb Co.	E
Euromed USA	E		
ExtractsPlus Inc.	E		
Exxentia	E		
Falcon Trading International	R,E,C		
FCC Products Inc.	R		

5.8.9 Barriers to Entry – Pale Purple Coneflower

High-quality seed is not commercially available. A lack of a definable market for this material over the next three-to-five years makes cultivating a risky proposition.

5.8.10 Distribution Channels – Pale Purple Coneflower

Distribution channels for this product are specialized and rely on experienced brokers and professionals to differentiate E. pallida from other species of the Echinacea genus. Most new growers of this material operate on a contracted basis with a single buyer.

5.8.11 Key Customer Requirements – Pale Purple Coneflower

Purity and high levels of echinacosides are the main requirements for buyers of this material. Buyers are looking for "true" E. pallida and not cross-hybrids with other strains. In the past, wild-harvest E. pallida and E. angustifolia were mixed together and sold as "Kansas Snake Root". This past practice has made buyers of this material very attentive to whom they buy from and exactly what they are buying.

5.8.12 Recent Developments – Pale Purple Coneflower

Cultivation has begun in South America on a small-scale basis. European nations, particularly Germany, are using E. pallida in place of E. angustifolia in some herbal products.

5.8.13 Commercial Visibility – Pale Purple Coneflower

Although E. pallida is somewhat popular in Germany, many producers will not consider using this product due to its unfavorable price structure as compared to E. purpurea. Its unknown medicinal comparison to E. angustifolia is another detriment. Of the top nutraceutical/botanical companies in North America and Europe, 13% offer this material as a stand-alone product, and 17% make this product available as either a stand-alone product or as part of a multi-constituent supplement.

5.8.14 Suitability to North Carolina Cultivation – Pale Purple Coneflower

While the product can be grown in eastern North Carolina, it is not native to the region. E. pallida cultivated in North Carolina is capable of producing higher levels of echinacosides than E. angustifolia.

5.8.15 Overall Assessment – Pale Purple Coneflower

The current price of this material, $10-$14 per pound of dried root, is susceptible to any increases in supply. The difficulty to "leapfroging" over E. angustifolia and E. purpurea to gain any significant increase in market share may not be possible to overcome. Without any predictable increases in demand or a contractual agreement with a substantial buyer, a multi-year commitment of resources to cultivating this material is difficult to justify.

Over the next three-to-five years, demand for this botanical will decrease five-to-ten percent on an annual basis. Prices will remain volatile due to a lack of commitment by growers to stabilize supplies with cultivated material and inconsistent demand by a small number of buyers in this market.

5.9 Botanical Overview - Purple Coneflower (Echinacea purpurea)

Purple Coneflower or *Echinacea purpurea (E. purpurea)* has a natural range extending south from Quebec to the southeastern United States and west to Texas. Of the three strains used for medicinal purposes, E. purpurea is the hardiest with the ability to withstand large temperature and soil moisture variations in its habitat. An herbaceous plant, E. purpurea grows at a rate of 12 inches to 18 inches a year to a mature height of 2 feet to 3 1/2 feet. The plant has oval-shaped leaves and produces flowers of deep purple color from June to August. **Unlike E. angustifolia and E. pallida, which possess a tap root system, E. purpurea has a fibrous root system.** This attribute makes cleaning the root more difficult than other Echinacea strains. The root is harvested three-to-four years from seed and is dried and stored under similar conditions to other Echinacea species.

5.9.1 Bioactive Components – Purple Coneflower

Bioactive components of this material include polysaccharides, glycoproteins, alkamides and polyynes. The polysaccharide components of this botanical have drawn the most attention of medical experts as they are believed to possess immunostimulatory properties.

5.9.2 Uses and Treatments – Purple Coneflower

E. purpurea has a long, well-established tradition of medicinal use in North America and Europe. In modern cultures, E. purpurea is believed to stimulate the immune system preventing colds and flu. In Europe, E. purpurea is the most widely accepted species of Echinacea used for medicinal purposes. Germany's *Commission E*. endorses E. purpurea as a treatment option for a number of ailments, including the common cold, fevers, urinary tract infections and burns. Table 5.9.2 summarizes E. purpurea's uses.

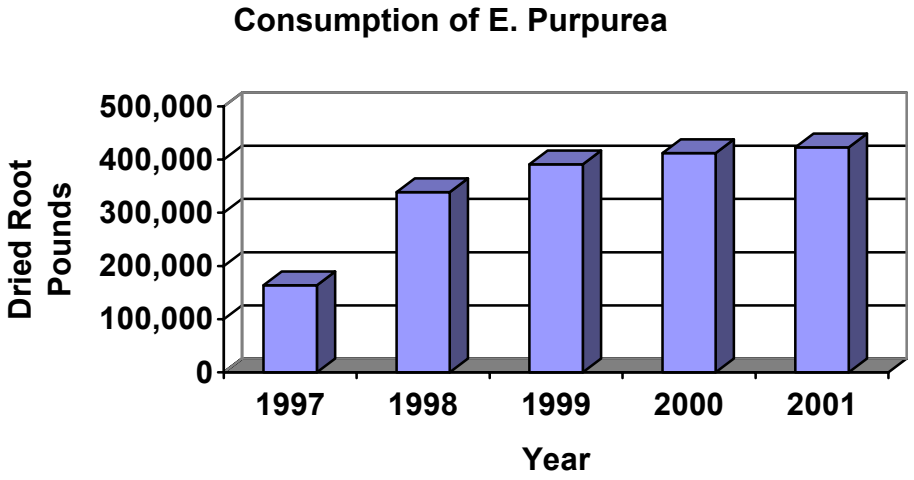
Table 5.9.2

Modern Uses	**Traditional/Folk Uses**
Stimulate the immune system	Treat fevers
Prevent colds, coughs and fevers	Skin infections
Heal wounds and burns	Insect bites and stings
Treat infections of the urinary tract	

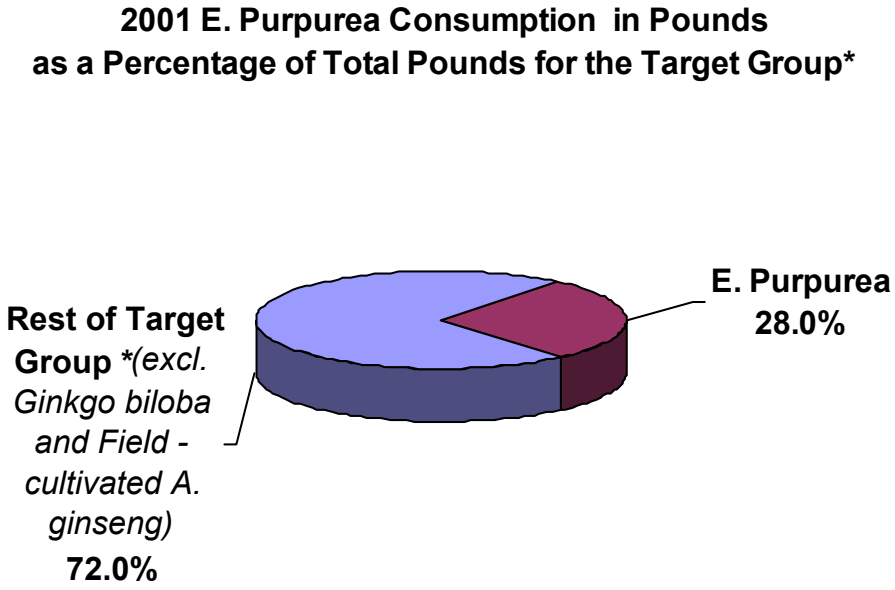
5.9.3 Market Overview – Purple Coneflower

5.9.3.1 Annual Consumption in Pounds – Purple Coneflower

In 2001, consumption of this material was approximately 430,000 pounds, 2 1/2 times the level of consumption in 1997 but only an increase of 2.7% over the level reached in the year 2000.

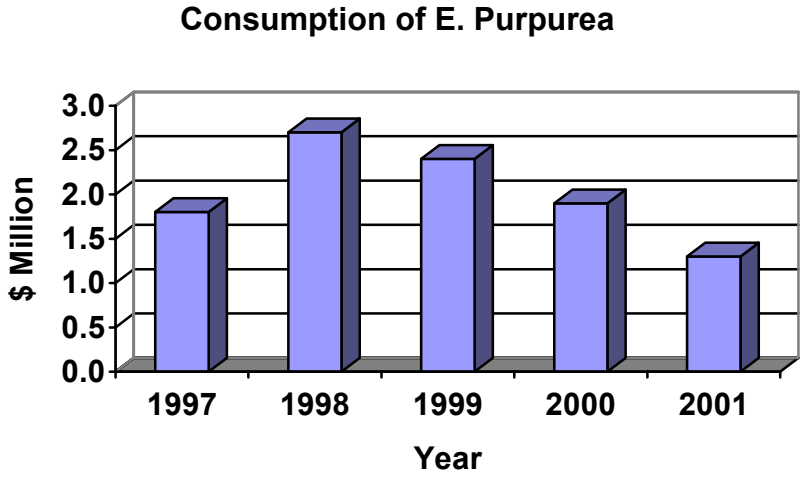


E. purpurea represents 28% of the target group* in 2001.

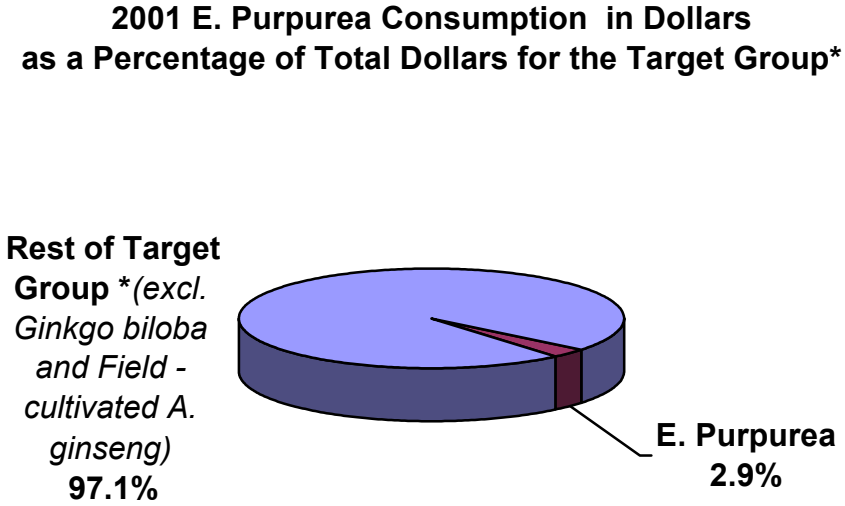


5.9.3.2 Dollar Value of Consumption – Purple Coneflower

The dollar value of consumption in 2001 was $1.2 to $1.3 million. This amount was about $500,000 less than the value in 1997. It was also $500,000 to $600,000 less than consumption in 2000.



This amount represents 2.9% of the target group* for the year 2001.



5.9.4 Supply/Demand Balance – Purple Coneflower

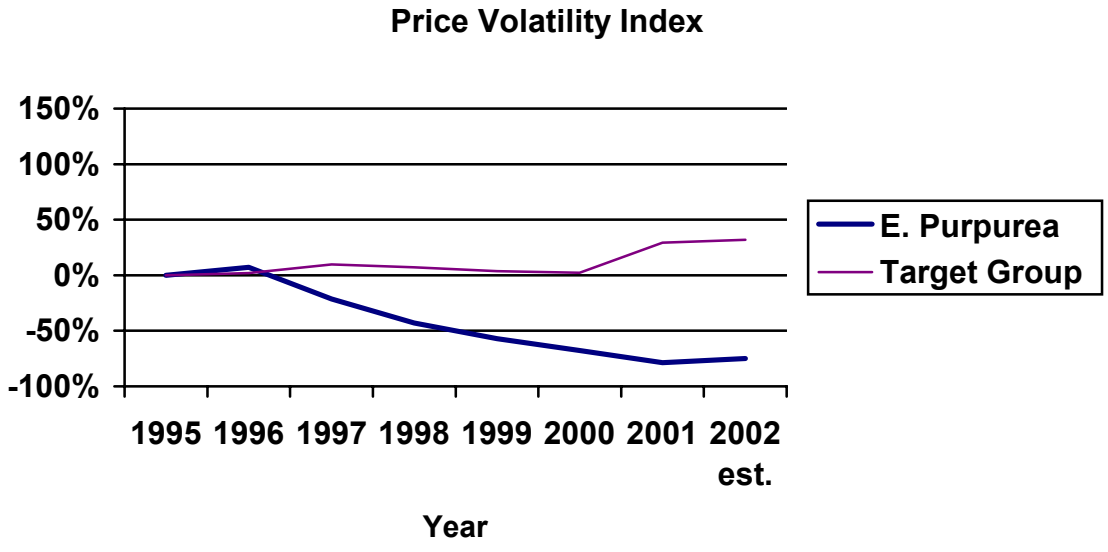
This product has been over-supplied to the market in substantial quantities for the last three years. Demand has continued to increase but at a declining rate due to competition from other Echinacea strains, particularly E. angustifolia.

5.9.5 Key Drivers of Demand Growth – Purple Coneflower

Price advantages to other Echinacea strains will maintain demand for this material from large processors and distributors that are less concerned with medicinal value and more concerned with consumer familiarity in the market. Competing camps in the Echinacea market have spurred new research into this botanical. The results of this research will determine the future growth prospects of E. purpurea as it relates to other Echinacea strains competing for an increased share of the market. This factor will especially come into play in the less mature markets of North America.

5.9.6 Price Volatility – Purple Coneflower

This product has settled into a very low price band. Unsold material from previous harvests continues to filter into the market and exert downward pressure. During 2001, this botanical traded around $3-$4 per pound of dried root.



5.9.7 Customer Concentration – Purple Coneflower

This material has a worldwide customer base consisting of large, medium and small processors. Demand for the product includes mainstream pharmaceutical companies that include E. purpurea in multi-constituent vitamin and mineral products.

5.9.8 Supplier Concentration – Purple Coneflower

Low prices have essentially eliminated all wild-harvest material coming to market over the past three years. Large growers have more than filled the void and are located in the United States (Washington, Oregon, Colorado, Idaho, Iowa, Missouri, New Mexico and Wisconsin), Canada, Germany, Australia, New Zealand and Switzerland.

Companies Associated with E. purpurea

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract
R – Whole Root/ Herb

5-HTP Co. Ltd.	E,C	JF Chemical Sales Inc.	R,E
A.M. Todd Group	E	Ji'an Natural Plant Extraction Factory	E
ACTA Health Products	R	Jinke Group USA Inc.	E
ADONISS Extraction	E	Juttner & Partner	R
Advanced Herbal Ingredient Inc.	E,C	K.-W. Pfannenschmidt GmbH	R
Advanced Labs	R	Kingchem Inc.	E
AF Nutraceutical Group Inc.	E	Klickitat Organics	R,E,C
AHD International	R,E,C	Linnea Inc.	E
AIDP Inc.	E	Longstar International Inc./J & P Nutriceutical Services	R,E
Alchem International Ltd.	E	Market New Zealand Ltd.	R,E,C
Alfa Chem	R,E	Maui Medicinal Herbs Inc.	R,E,C
AMAX NutraSource Inc.	R,E	Maypro Industries Inc.	R,E
American Ingredients	R,E	Mehta Pharmaceuticals Pvt. Ltd.	E
American Botanicals	R	MiniStar International Inc.	E
Amrita Aromatherapy	E	Modern Natural Products	R,E,C
AnMar International Ltd.	E	Monteloeder SL	E
Arkopharma	R	Morse Chemical Inc.	R

Ayush Herbs Inc.	E	Natural Source International Inc.	E
B & D Nutritional Ingredients Inc.	R,E	Nature*4*Science	E
B & K International/Famarco Ltd. Inc.	R,E	Nature's Cathedral	R
BattleChem Distribution Inc.	E	Nature's Way Products	R
BDS Natural Products	R	NHK Laboratories Inc.	R,E
Belmont Chemicals Inc.	E	Northwest Botanicals Inc.	R,C
Beta Pure Foods Inc.	E	Novel Ingredient Services LLC	R,E
BI Nutraceuticals	R	Nutrilife LLC (China)	E
Bio-Botanica Inc.	E,C	NutriScience Innovations LLC	R,E
Blue California	R,E,C	Nutura Internacional s.l.	E
Buckton Scott Nutrition Inc.	R	Omana Group LLC	E
California Energy Nutriceuticals - C.E.N.	E,C	OptiPure Chemco Industries Inc.	E
Cape Cod Organics & Nutraceuticals Corp.	R,E	Orcas International Inc.	R,E
Chart Corp. Inc.	E	P.L. Thomas & Co. Inc.	R,E
Cherain Chemicals	E	Pacific Botanicals	R,C
China MEHECO Herbs I/E Corp.	R,E	Pacific Rainbow International Inc.	E
Chinese Herbal Ingredient Inc.	R	Pharmachem Laboratories Inc.	R,E
Chinese Natural Herbal Extracts Group Inc.	R,E,C	Pharmline Inc.	R,E
Cognis Nutrition & Health	R,E	Qingdao Etsong Sun-Star Co. Ltd.	E
CPB International Inc.	R,E	Qingdao FTZ Samin Trading Co. Ltd.	E
Crystal Innovation International	E	Quality Botanical Ingredients Inc.	R,E
Crystals International Inc.	E,C	Renaissance Herbs Inc.	E
Dalian Tianshan Industrial Co. Ltd.	R,E	RFI Ingredients	R,E
Dempsey Corp.	E	RIA International LLC	R,E
Desert Herb Co. Inc.	E	Ricera American Corp.	R,E
Deyang Shutai Ginkgo Development Co.	E	RMA Laboratories Inc.	E
DNP International Co. Inc.	R	San Francisco Herb & Natural Food Co.	R,E
Doingcom Chemicals Co. Ltd.	R,E	Scidoor Hi-Tech Biology Co. Ltd.	E
DongAn Industrial Corp.	E	Shandong Luye Pharmaceutical Co. Ltd.	R,E
Draco Natural Products	R,C	Shanghai Freemen International Trading Co. Ltd.	R,E
E.M. Sergeant Pulp & Chemical Co. Inc.	R,E	Shanghai Wenda Biotech Inc.	E
East-West Imports	E	Soft Gel Technologies Inc.	E
Ecuadorian Rainforest LLC	E	Source Connections LLC	E
Elixir International of New Mexico Inc.	R,E	Starwest Botanicals Inc. - Bulk Division	R,E,C
Energique Inc.	E	STC International Inc.	E
Essential Wholesale	R,E	Stryka Botanics	R,E,C
EUL International Herb Mfg. Inc.	R,E	Suan Farma Inc.	R,E
Euromed USA	R,E	Sun-Rich Chemical	R,E
ExtractsPlus Inc.	E	TCD China	R,E
Exxentia	E,C	Technical Sourcing International	E
Falcon Trading International	E	To Your Health	R,E
FCC Products Inc.	R	Triarco Industries	E
Flavine North America Inc.	E	Trout Lake Farm LLC	R,E,C
Fortune Bridge Co. Inc.	E	U.S. Nutraceuticals LLC	R,E
Furfural Espanol SA	R	Unipharm Co. Ltd	R,E
Gee Lawson Nutritional	R,E,C	United Nutrition LLC	R,E,C

Gencor Pacific Inc.	R	Van Drunen Farms	R,C
Global Marketing Associates Inc.	R	Vitality Works Inc.	E
Gourmet Nutrition	R,E	Vita-Pharm International Inc.	E
Green Biochemicals Inc.	R,E	Whole Herb Co.	R,E
GuiLin Natural Ingredients Inc.	R,E	Wonder Trading USA Inc.	E
Hainan Zhongxin Chemical Co. Ltd.	E	Wright Group, The	E
Hawk Biopharma	E	Xinguang Ind Prod I/E Corp.	R,E
Health Brands Inc.	R,E,C	Zhejiang Medicines & Health Products I/E Co. Ltd.	R,E
Herb Trade Inc.	E	Zhejiang Orient Tea Development Co. Ltd.	E
Herbco International Inc.	E		
Honson Ingredients Ltd.	E		
Hunan Botanical Industrial Co. Ltd.	E		
IndexSalus Ltd.	R		
Indena SpA - Italy	R,C		

5.9.9 Barriers to Entry – Purple Coneflower

Initial start-up costs are very low. This material can be grown almost anywhere within the temperate zones.

5.9.10 Distribution Channels – Purple Coneflower

Most growers deal directly with processors and are vertically integrated with large processors. They also negotiate through cooperatives.

5.9.11 Key Customer Requirements – Purple Coneflower

Most buyers of this product require high levels of polysaccharides, equating to a minimum or threshold level of 4% for total phenolic compounds. In addition, organic certification has become a major selling point among large, vertically integrated producers attempting to differentiate their products in the market to raise profit margins.

5.9.12 Recent Developments – Purple Coneflower

Oversupply in the market has leveled off but will continue to put pressure on current prices. Large companies continue to capture supply chains in order to improve the quality of the raw materials used in their products.

Many buyers are rejecting material stored from past harvests. They are willing to pay a moderate premium for newly grown and harvested material.

5.9.13 Commercial Visibility – Purple Coneflower

E. purpurea is the best known strain of Echinacea on world markets. Of the top nutraceutical/botanical companies in Europe and North America, 35% offer this material as a stand-alone product, while 70% offer it as either a stand-alone product or as part of a multi-constituent supplement.

5.9.14 Suitability to North Carolina Cultivation – Purple Coneflower

E. purpurea will grow in many parts of the world and is being grown in most of them. Climatically, North Carolina can grow E. purpurea but should only proceed under a contracted grower-buyer relationship.

5.9.15 Overall Assessment – Purple Coneflower

At this time, E. purpurea is a high-volume, low-value crop. Cultivation is currently being taken out of production in North America. Current and stored supplies of this material will continue to cap prices at very low levels. Large buyers are willing to pay a premium for fresh material. If cultivation is not exactly in line with buyer requirements, the lack of a market for warehoused material will greatly impact the overall economic viability of the endeavor.

The demand for freshly cultivated material will experience an annual growth rate of between five percent and ten percent over the next three-to-five years. Supplies will remain consistent with demand, keeping prices in the $3-$5 (per pound) band for the foreseeable future.

5.10 Botanical Overview - Skullcap (Scutellaria lateriflora)

Skullcap has a natural range throughout North America east of the Rocky Mountains in the temperate zones. It is widely distributed in woods, moist thickets and marshes. It is an herbaceous perennial that grows to a mature height of 24 inches to 30 inches. The Skullcap plant produces a blue flower from July to September. It is the aerial part of the plant that is harvested at bloom and used for medicinal purposes. Once harvested, this material is incorporated into the flavonoid. **It must be used in a tincture of alcohol/water or immediately powdered. If not, the material will begin to dry out and lose its medicinal potency.**

5.10.1 Bioactive Components - Skullcap

The main bioactive components of Skullcap are scutellarein, its glycoside, scutellarin, and the flavonoid baicalein, and its glycoside, baicalin. The medicinal properties of these components are listed as antispasmodic, diuretic and sedative.

5.10.2 Uses and Treatments - Skullcap

The Cherokee Indians used Skullcap as part of a concoction given to women to promote menstruation. It was also used for diarrhea and breast pain. In early 18th century America, Skullcap was used in the treatment of rabies and was given the nickname "Mad Dog". Today, it is used for the treatment of anxiety and depression. Table 5.10.2 summarizes Skullcap's medicinal uses.

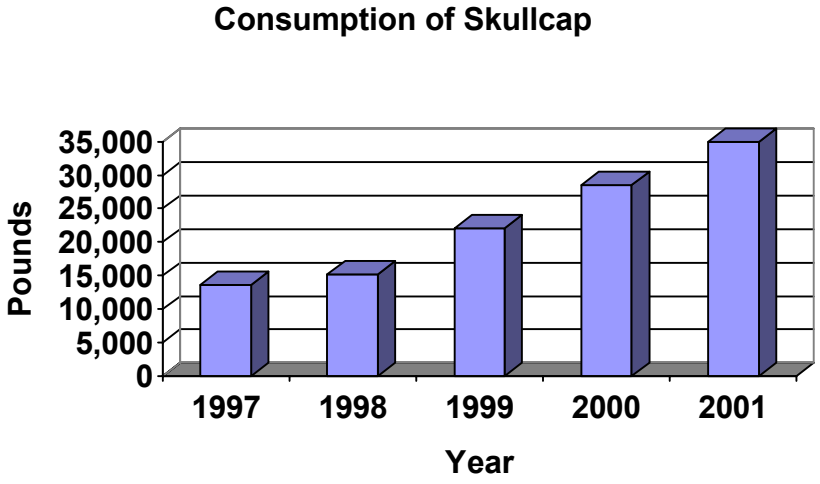
Table 5.10.2

Modern Uses	**Traditional/Folk Uses**
Nervous disorders	Rabies
Insomnia	Epilepsy
Digestive problems	Diarrhea

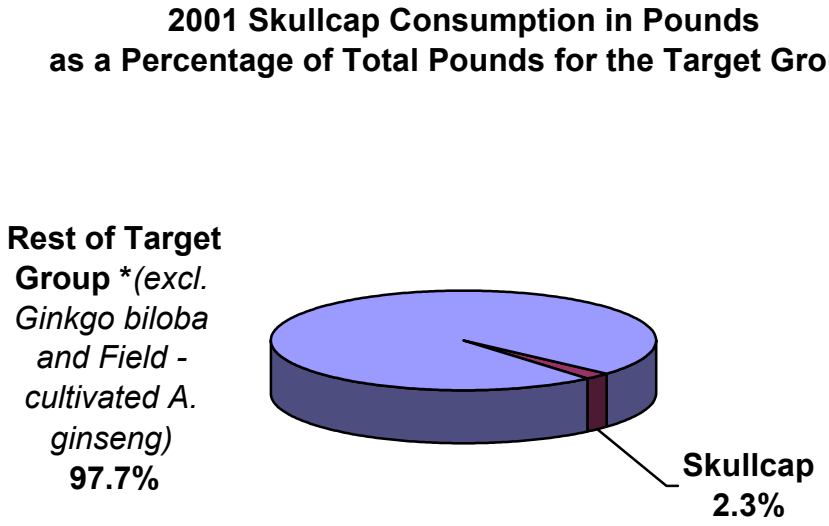
5.10.3 Market Overview - Skullcap

5.10.3.1 Annual Consumption in Pounds - Skullcap

In 2001, approximately 35,000 pounds was harvested and sold on world markets, over 2 1/2 times the 1997 harvest and an increase of about 23% over 2000 harvest levels.

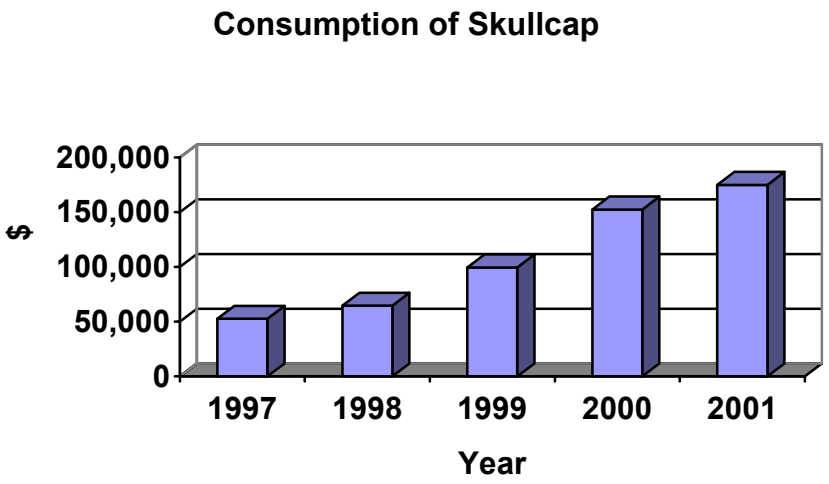


Skullcap represents 2.3% of the target group* in 2001.

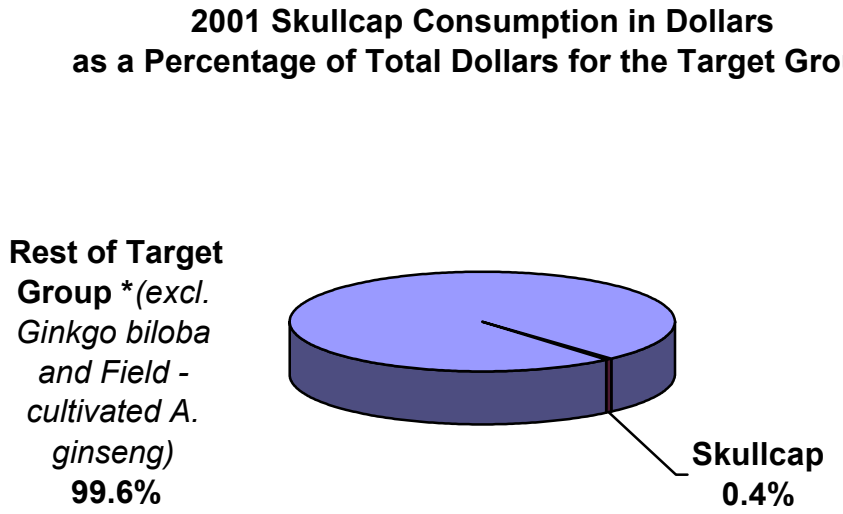


5.10.3.2 Dollar Value of Consumption - Skullcap

The dollar value of the 2001 harvest was between $185,000 and $195,000. This amount is more than 3 1/2 times greater than the harvest value in 1997 and about 23% higher than the value in 2000.



Overall, Skullcap represents 0.4% of the target group* for the year 2001.



5.10.4 Supply/Demand Balance - Skullcap

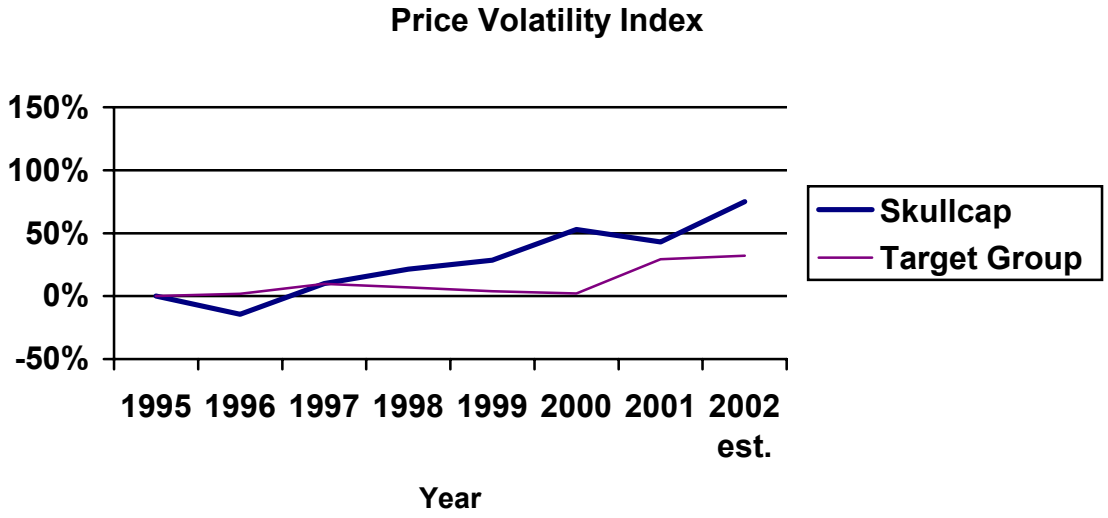
Supply and demand pressures are currently in balance. Wild-harvest and cultivated materials have been adequate to handle a slowly increasing demand. A slight oversupply of this botanical in the fall of 2001 has worked its way through the system without any major pricing adjustments. Over the last quarter of 2002, demand for this material has increased sharply.

5.10.5 Key Drivers of Demand Growth - Skullcap

Additional positive clinical support for this product is necessary in order to gain any appreciable increases in demand. These results are especially needed in the major medicinal herb markets of Europe and Asia. **Acceptance by European consumers, currently under a ban of kava supplements, is the major long-term driver of demand for this material.**

5.10.6 Price Volatility - Skullcap

Small supply disruptions, attributable to lower-than-expected wild-harvest material coming to market, have led to some modest upward price pressure over the past five years. An oversupply of wild-harvest material in the fall of 2001 has worked its way through the system, and prices were stable until March 2002. During 2001, prices of this material ranged from $4-$6 per pound. Over the last three-to-six months of 2002, prices have spiked upwards, and this botanical currently trades at the high end of its historic $4-$8 per pound price band.



5.10.7 Customer Concentration - Skullcap

Buyers can be found worldwide for this botanical. However, they tend to represent very small interests.

5.10.8 Supplier Concentration - Skullcap

70% of the harvested pounds of this product in 2001 came from small growers outside of North America. 85% of the entire 2001 harvest came from cultivated sources.

Companies Associated with Skullcap

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract
R – Whole Root/ Herb

A.M. Todd Group	E	Jinke Group USA Inc.	E
Advanced Labs	R	Kingchem Inc.	E
Alfa Chem	R,E	Klickitat Organics	R,C
AMAX NutraSource Inc.	E	KR Natural Products	P
American Botanicals	R	Mafco Natural Products	R
American Ingredients	R	Maypro Industries Inc.	R,E
Amitco International	R,E	MiniStar International Inc.	E
Asia Natural Products Inc.	R	Monteloeder SL	E
B & K International/Famarco Ltd. Inc.	R	Motherland International Inc.	E
BattleChem Distribution Inc.	E	Naturex Inc.- Brucia Plant Extracts	E
BDS Natural Products	R	Nutraceutical Corporation	R,E
Bella Vita Botanicals Inc.	R	Northwest Botanicals Inc.	R,C
Bio-Botanica Inc.	E	P.L. Thomas & Co. Inc.	E
Blue California	E	Pacific Botanicals	R,C
Cape Cod Organics & Nutraceuticals Corp.	R,C	Pure World Botanicals Inc.	R,E

Chart Corp. Inc.	R,E	Qingdao FTZ Samin Trading Co. Ltd.	R
China Herbs & Natural Products International Corp.	E	Quality Botanical Ingredients Inc.	R,E
China MEHECO Herbs I/E Corp.	R,E	RIA International LLC	R,E
Deyang Shutai Ginkgo Development Co.	R,E	RMA Laboratories Inc.	E
Draco Natural Products	E	Sampac Enterprises	R,E
Ecuadorian Rainforest LLC	R,E	Source Connections LLC	E
Energique Inc.	E,C	Starwest Botanicals Inc.	R,C
Falcon Trading International	R,E,C	Stryka Botanics	R
FCC Products Inc.	R	Synergy Production Laboratories	R,C
Gee Lawson Nutritional	R	TCD China	E
GuiLin Natural Ingredients Inc.	E	To Your Health	R,E,C
Hainan Zhongxin Chemical Co. Ltd.	E	Trout Lake Farm LLC	R,C
Herb Trade Inc.	R,C	U.S. Nutraceuticals LLC	R,E
Herbalist & Alchemist	R	United Nutrition LLC	E
Herbco International Inc.	R	Whole Herb Co.	R,E
Honson Ingredients Ltd.	E	Wonder Trading USA Inc.	R
Hunan Botanical Industrial Co. Ltd.	R,E,C	Xinguang Ind Prod I/E Corp.	E
IRMA Corp.	E	Zhejiang Medicines & Health Products I/E Co. Ltd.	E
Ji'an Natural Plant Extraction Factory	E	MediHerb Inc.	R

5.10.9 Barriers to Entry - Skullcap

Although seed is commercially available, site selection is difficult. **Skullcap requires areas of constant moisture**, such as moist thickets or marshlands, to grow.

5.10.10 Distribution Channels - Skullcap

Small producers use established, brokers to bring buyers and sellers together. Some customers will deal directly with harvesters.

5.10.11 Key Customer Requirements - Skullcap

Most customers have specific harvest protocols. Many buyers require that the material be harvested at a certain time of the year or during a particular stage of bloom.

5.10.12 Recent Developments - Skullcap

Skullcap has recently been advocated by herbalists as a treatment alternative to kava. This news has resulted in an increase in demand for this material during the last quarter of 2002.

France, Germany and Switzerland have banned the use of kava as a herbal supplement due to its association with liver damage in some users. As of December 2002, the United Kingdom is also expected to impose a ban on kava supplements due to similar health concerns.

5.10.13 Commercial Visibility - Skullcap

Of the top nutraceutical/botanical companies in North America and Europe, 22% offer this material as a stand-alone product, and 33% offer it has as stand-alone product or as part of a multi-constituent supplement.

5.10.14 Suitability to North Carolina Cultivation - Skullcap

Skullcap will grow in very select areas throughout North Carolina. The state does possess the natural raw materials to cultivate high-quality Skullcap, and this crop may be a viable alternative for some growers to cultivate on land less suited for other crops.

5.10.15 Overall Assessment - Skullcap

The market may exhibit moderate-to-strong increases in demand as more countries in Europe ban or place severe restrictions on the use of kava. Suppliers are small and geographically widespread. This factor limits the percentage of crop loss associated with poor local conditions; however, these same suppliers will be unable to meet the projected increase in demand for this material.

With momentum still building against kava in the mature herbal markets of Europe, Skullcap seems poised for demand growth in the range of 20% to 30% annually over the next three-to-five years. Upward price pressure in this market strongly suggests that current supplies will be unable to satisfy the future demand for this material without significant upward price adjustments.

5.11 Botanical Overview - Wild indigo (Baptisia tinctoria)

Wild indigo is native to North America with a natural range extending from Georgia north to southern Quebec and west to Minnesota and Iowa. It is an herbaceous perennial that grows to a mature height of 3 feet to 3 1/2 feet. Yellow flowers begin to appear in early summer and continue into early fall. The medicinal part of the plant is the root which is harvested in the fall. The root is dried in normal seasonal temperatures by air circulation rather than heat to complete the drying process.

5.11.1 Bioactive Components – Wild indigo

The main bioactive components of Wild indigo are the alkaloids cytisine and anagyrine and a variety of isoflavanoids. The main physiological effects of these bioactives are an improvement in the endogenous defense reaction and a mild estrogenic response.

5.11.2 Uses and Treatments – Wild indigo

Wild indigo was a favorite medicine of the indigenous peoples of North America and was used as a topical antiseptic for burns and wounds to the skin. In western cultures of North America and Europe, it is still used for its antiseptic properties but has also found use in drugs stimulating the immune system. Yellow and blue dyes have been produced from the product for a number of commercial uses in the United States and Europe. This material has not been recommended as a treatment for any ailments according to Germany's *Commission E*. Table 5.11.2 summarizes the uses of Wild indigo.

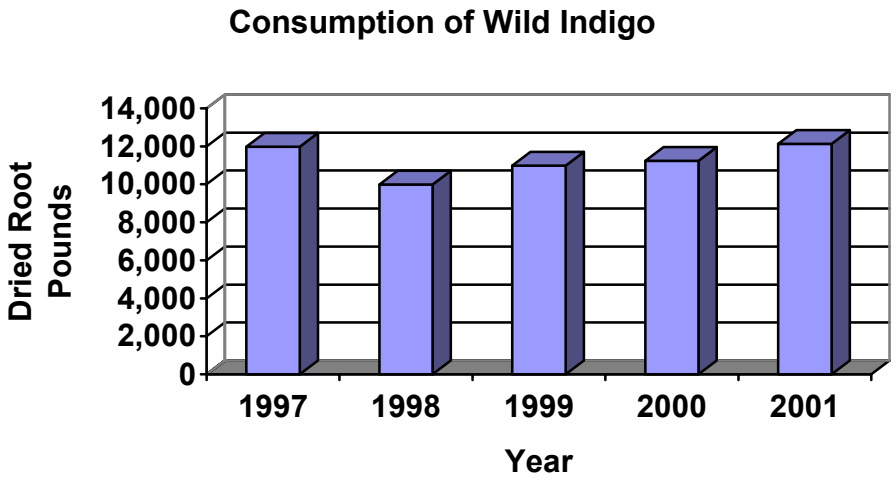
Table 5.11.2

Modern Uses	**Traditional/Folk Uses**
Creates an estrogen-like effect	Topical antiseptic
Stimulates the immune system	Common colds
Dye component	Fever

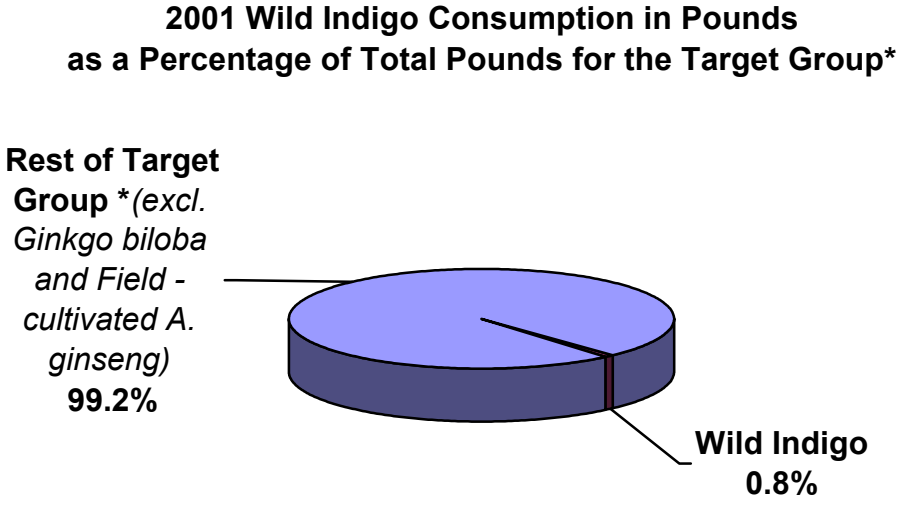
5.11.3 Market Overview – Wild indigo

5.11.3.1 Annual Consumption in Pounds – Wild indigo

Approximately 12,000 pounds of this material was consumed in 2001. This consumption was equal to the 1997 amount and 8% higher than the level reached in 2000.

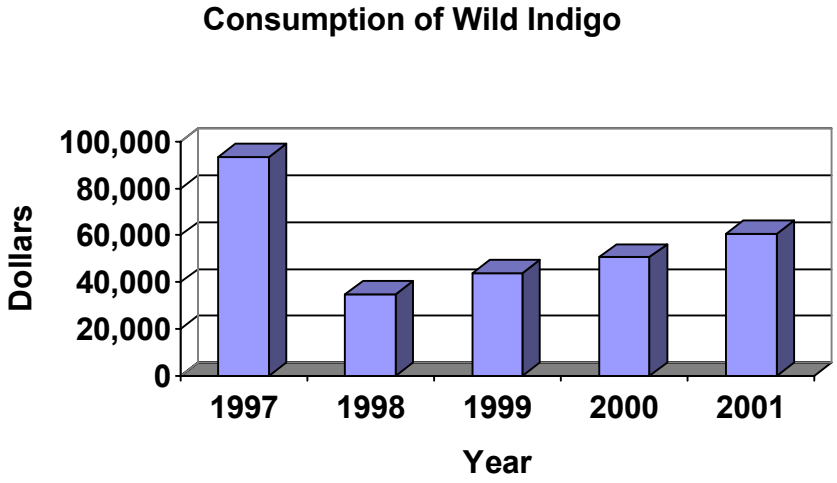


This total represents 0.8% of the target group* in the year 2001.

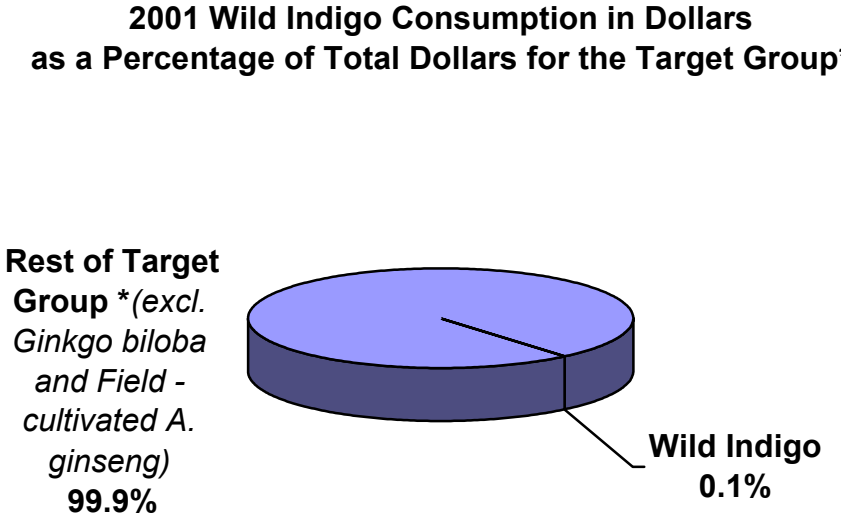


5.11.3.2 Dollar Value of Consumption – Wild indigo

The dollar value of consumption in 2001 was between $54,000 and $58,000. It is a 42% decrease from 1995 levels but is 7% higher than 2000 levels.



The dollar value consumption of Wild indigo comprises 0.1% of the total group* for the year 2001.



5.11.4 Supply/Demand Balance – Wild indigo

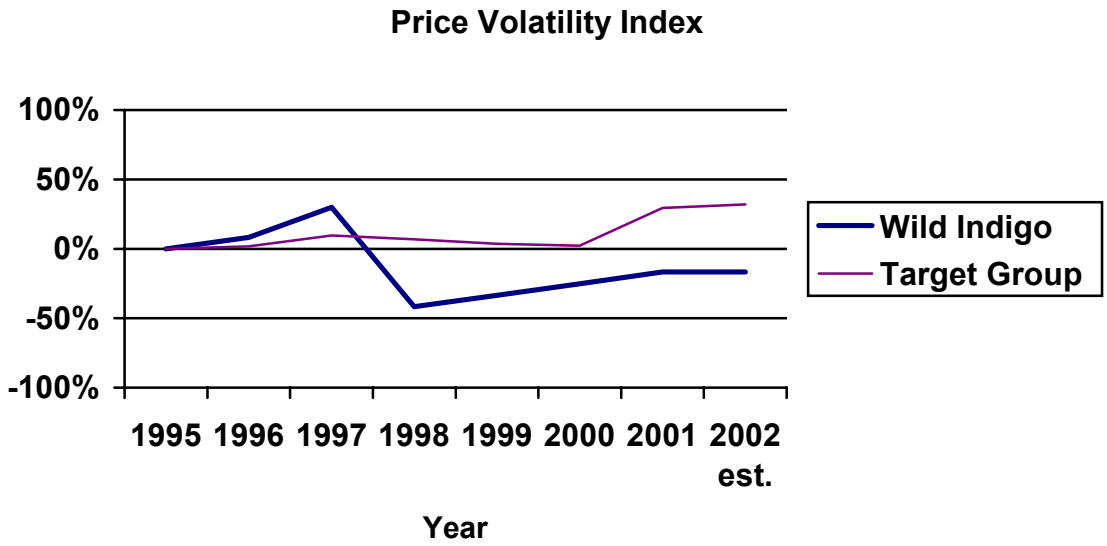
Few forces are currently at play in this small market. Some conservationists and herbalists, concerned that the small pockets of natural populations will be adversely affected by any increase in demand, are tempering potential commercial demand for this material.

5.11.5 Key Drivers of Demand Growth – Wild indigo

Moderate interest in Wild indigo exists from herbalists for medicinal attributes and from organizations as a dye component for industrial uses. Demand for this material are dependent upon research currently being conducted as to its effectiveness as a component of immunostimulating drugs.

5.11.6 Price Volatility – Wild indigo

This product trades within a very narrow range at low price levels. This material dropped into a lower price ban in 1998 and shows no signs of recovery. During 2001, this material traded in a tight range of roughly $4.50-$5.00 per pound of dried root.



5.11.7 Customer Concentration – Wild indigo

Buyers of this botanical represent mainly small North American concerns. European buyers have shied away from wild-harvest material in North America due to quality issues.

5.11.8 Supplier Concentration – Wild indigo

Wild indigo is wild-harvested in its North American natural range by low-volume suppliers. Only 5% of the material on the market in 2001 came from cultivated sources. Some very small pockets of cultivation are currently located in the United States, Germany, France, Italy and the Netherlands.

Companies Associated with Wild indigo

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract
R – Whole Root/ Herb

A.M. Todd Group	E	Bella Vita Botanicals Inc.	R
Advanced Labs	R	Herbalist & Alchemist	R
Alfa Chem	R,E	Kremer Pigmente (Industrial Use)	R
AMAX NutraSource Inc.	E	MediHerb Ltd.	R
American Botanicals	R	Schaper & Brummer GmbH	E,R
Brakes Root and Herb	R	U.S. Nutraceuticals LLC	R,E

5.11.9 Barriers to Entry – Wild indigo

Seed stock is not commercially available. Asexual propagation is difficult and requires a long-term commitment.

5.11.10 Distribution Channels – Wild indigo

Buyers rely on experienced brokers and professionals. It is not easy to differentiate this product from other species within the same genus.

5.11.11 Key Customer Requirements – Wild indigo

Requirements for this material include correct identification within the genus and high levels of dye compounds.

5.11.12 Recent Developments – Wild indigo

Some interest in this material exists as an immune system stimulator. Schaper and Brummer, a German company, uses Wild indigo as an ingredient in its immunomodulating drug, Esberitox. It is also prescribed with Echinacea in the treatment of chronic viral infections.

5.11.13 Commercial Visibility – Wild indigo

This botanical does not have a great deal of visibility with consumers. It is more of an herbalist specialty product. Of the top nutraceutical/botanical companies in North America and Europe, 8% currently make this material available as a stand-alone product, and only 10% offer Wild indigo as a stand-alone product or as part of a multi-constituent supplement.

Confusion identifying "true" Wild indigo from other species in the genus continues to hurt the marketability of this material. In 1997, some products were found to contain "mixed" Baptisia components. This situation culminated with a general recall of all products containing Wild indigo.

Wild indigo has been widely replaced in the dye industry by cheaper and more consistent artificial compounds.

5.11.14 Suitability to North Carolina Cultivation – Wild indigo

Wild indigo will grow on suitable sites at lower elevations in the eastern region of North Carolina and can be grown in row crop conditions in the Foothills, Piedmont and Eastern Coastal Plain.

5.11.15 Overall Assessment – Wild indigo

Wild indigo is a low priority relative to other botanical cultivation opportunities in North Carolina. Any future demand in Europe for this material will be satisfied by cultivated sources, and Europeans prefer growing their own Wild indigo on small-acreage plots in Europe.

This material will experience a decrease in annual growth of between 1% and 5% annually over the next three-to-five years. Prices will remain low as interest in this material continues to decline.

5.12 Botanical Overview - Wild yam (Dioscorea villosa*)*

Wild yam is native to North America with a natural range from Florida north to southern Quebec and west to Texas. It is an herbaceous perennial that grows to a mature height of 9 feet. Wild yam is a climbing plant and supports itself by winding around the branches of other plants. The plant produces small greenish-yellow flowers from September to October and requires moist, well-drained soil and moderate sunlight to flourish. The root is the medicinal part of the plant and is harvested in the fall. It is dried under seasonal temperatures, relying on constant airflow to perform the drying process. Prolonged storage of the dried root may lessen the medicinal value of this material. Most sources recommend that the root not be stored more than one year from harvest.

5.12.1 Bioactive Components – Wild yam

The main bioactive components of Wild yam are the saponin, diosgenin, and the alkaloids, dioscorin and dioscorine. These components are believed to have antispasmodic, cholagogue and diaphoretic effects. Wild yam contains a progesterone precursor used by the pharmaceutical industry to produce progesterone.

5.12.2 Uses and Treatments – Wild yam

In the 18th and 19th centuries, Wild yam was used to treat menstrual cramps and problems associated with childbirth. The American Indians used it for birth control. Today, Wild yam is used worldwide as an ingredient in many topical cremes and in the production of steroid hormones such as cortisone. Germany's *Commission E*. does not currently recommend any uses for Wild yam. Table 5.12.2 summarizes the modern and traditional uses of Wild yam.

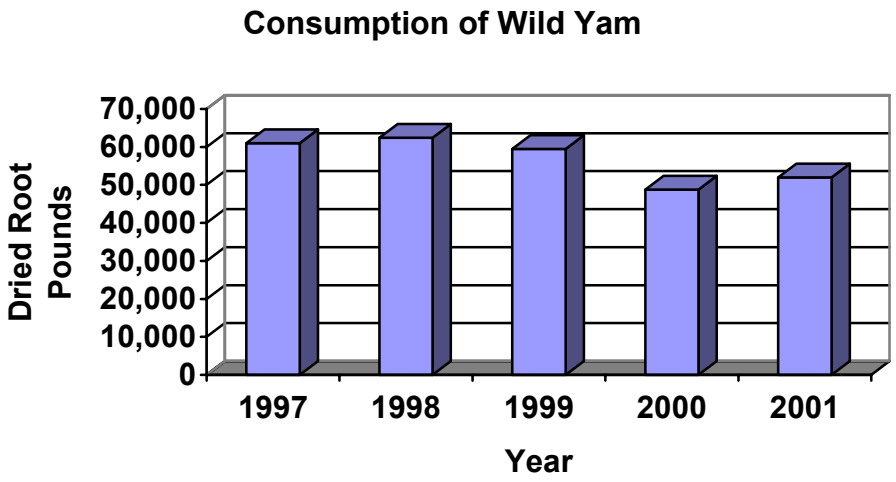
Table 5.12.2

Modern Uses	**Traditional/Folk Uses**
Lowers blood pressure and cholesterol levels	Birth control
Osteoporosis	Menstrual cramps
Steroid production	Hemorrhoids
Rheumatoid arthritis	

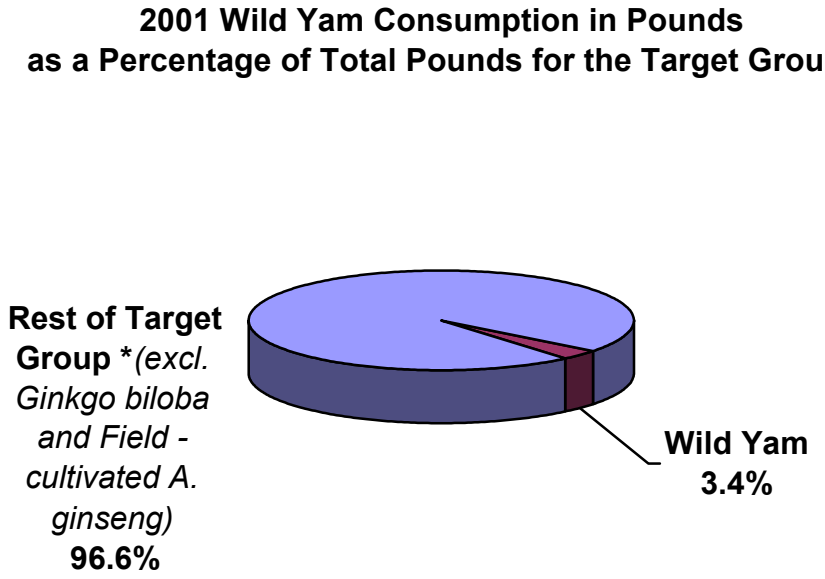
5.12.3 Market Overview – Wild yam

5.12.3.1 Annual Consumption in Pounds – Wild yam

In 2001, approximately 52,000 pounds of Wild yam were consumed. This amount is about 15% less than consumption in 1997 but about 7% higher than the level of consumption reached in 2000.

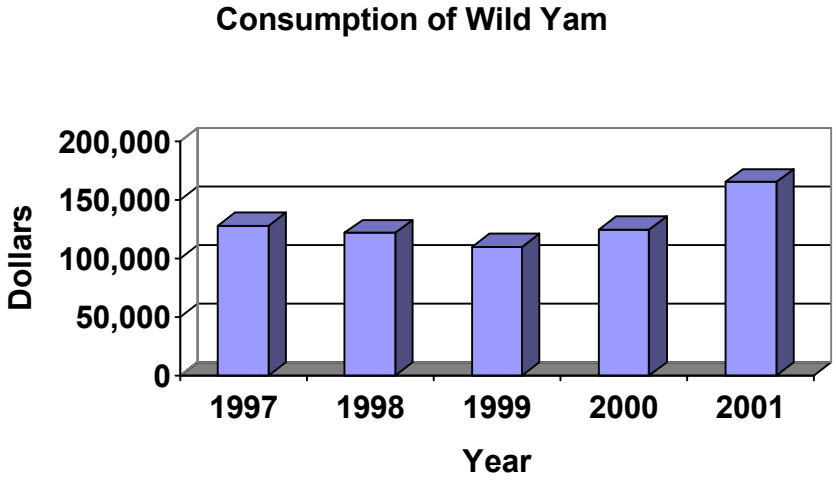


This consumption represented 3.4% of the target group* for 2001.

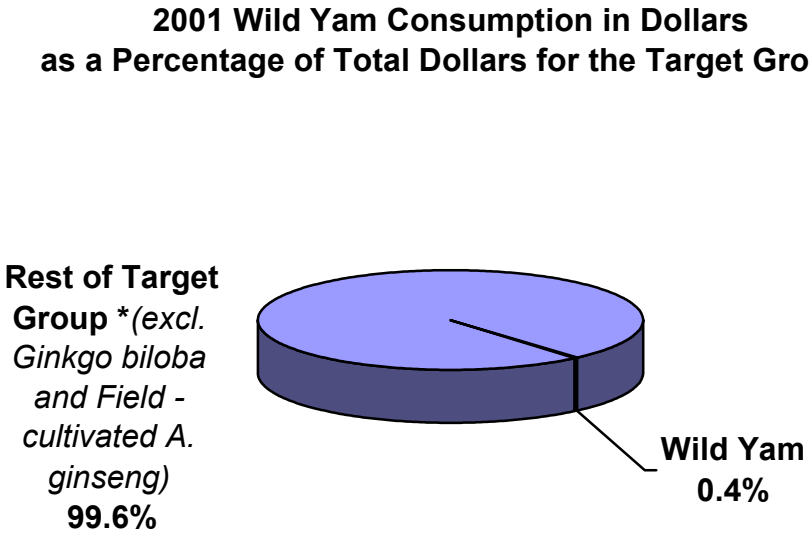


5.12.3.2 Dollar Value of Consumption – Wild yam

The dollar value of consumption in 2001 was approximately $165,000, about 29% higher than the level reached in 1997 and about 33% higher than the level in 2000.



This amount represents 0.4% of the target group* for the year 2001.



5.12.4 Supply/Demand Balance – Wild yam

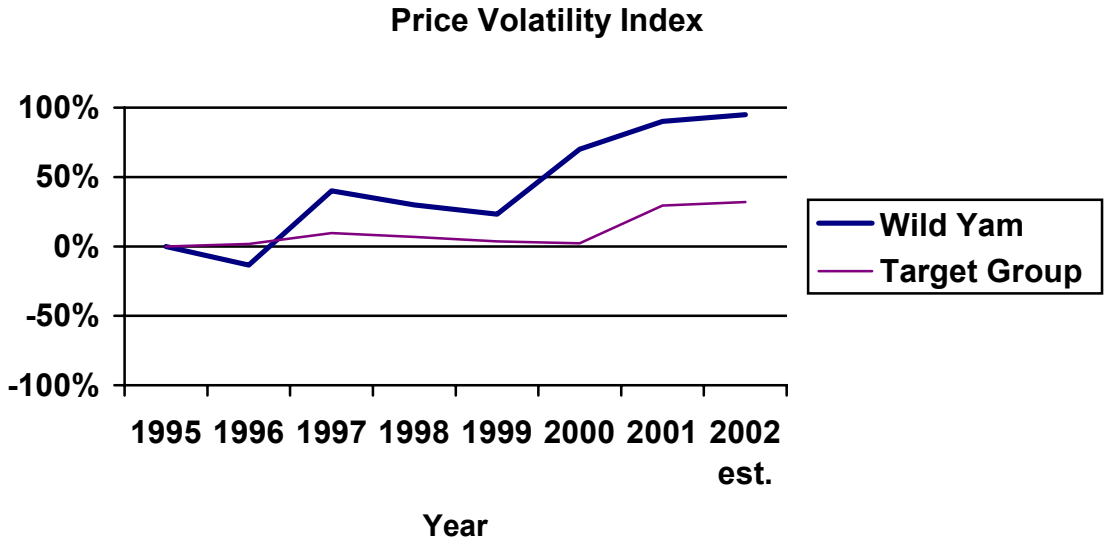
Current demand slightly exceeds supply for this botanical. This material rarely demonstrates any prolonged supply/demand disturbances due to a lack of differentiation from over 100 plants in the same genus that possess similar medicinal properties.

5.12.5 Key Drivers of Demand Growth – Wild yam

Increased use as a Hormone Replacement Therapy (HRT) and further penetration into European markets are vital to the growth prospects for this botanical.

5.12.6 Price Volatility – Wild yam

Although almost 100% of the supply of this material is wild-harvest, the supply from season to season has been consistent with demand over the past two years. The price of this product broke through to the upside in 1997 and made another less pronounced move in late 1999. It has been able to maintain itself in this higher, albeit still very low price band, over the last twelve months. During 2001, the price of this material ranged from $2.50-$3.50 per pound of dried root.



5.12.7 Customer Concentration – Wild yam

Wild yam is routinely found in the product mix of many producers and distributors in North and South American markets.

5.12.8 Supplier Concentration – Wild yam

Wild yam is wild harvested throughout its natural range by low-volume collectors.

Companies Associated with Wild yam

P – Powder
C – Use/ Produce Certified Organic Material
E – Extract
R – Whole Root/ Herb

ACTA Health Products	R,E	K.-W. Pfannenschmidt GmbH	E
Advanced Herbal Ingredient Inc.	E,C	KR Natural Products	P
Advanced Labs	R	Klickitat Organics	R,C
AHD International	R,E	Longstar International Inc./J & P Nutriceutical Services	R,E
AIDP Inc.	E	M & A Combine Ltd.	E
Alfa Chem	R,E	Mafco Natural Products	R
AMAX NutraSource Inc.	E	MediHerb Ltd.	R,P
American Ingredients	R,E	Mehta Pharmaceuticals Pvt. Ltd.	E
Amitco International	R,E	MiniStar International Inc.	E
Ashland Distribution Co.	R	Motherland International Inc.	E
Asiamerica International Inc.	R,E	MTC Industries Inc.	E
ATZ Natural	E	NHK Laboratories Inc.	R,E
BDS Natural Products	R,E	Northwest Botanicals Inc.	R,C
Bella Vita Botanicals Inc.	R	Novel Ingredient Services LLC	E
BI Nutraceuticals	R	NuLiv Science Inc.	R,E
Brakes Root and Herb	R	Nutrichem Resources Co.	E
Bio-Botanica Inc.	E	Nutrilife LLC (China)	E
Biochemicals International Inc.	R	Omana Group LLC	E
Blue California	E	Orcas International Inc.	E
Brucia Plant Extracts	R,P,E	P.L. Thomas & Co. Inc.	R,E

Chart Corp. Inc.	R,E	Pacific Botanicals	R
Cherain Chemicals	R,E	Pacific Rainbow International Inc.	E
China Herbs & Natural Products International Corp.	E	Pharm East Inc.	E
China Jiangsu International Economic-Technical Coop. Corp.	R,E,C	Pharmachem Laboratories Inc.	E,P
China MEHECO Herbs I/E Corp.	R,E	Pharmline Inc.	R,E
Chinese Herbal Ingredient Inc.	E,C	Qingdao Etsong Sun-Star Co. Ltd.	R,E
Chinese Natural Herbal Extracts Group Inc.	R,E,C	Qingdao FTZ Samin Trading Co. Ltd.	E
DNP International Co. Inc.	E	Quality Botanical Ingredients Inc.	R,E
Ellis & Everard Ltd.	R,E	RIA International LLC	R,E
Energique Inc.	E,C	RMA Laboratories Inc.	E
Essential Wholesale	E	Sampac Enterprises	R,E
Falcon Trading International	R,E,C	San Francisco Herb & Natural Food Co.	R
FCC Products Inc.	R	Scidoor Hi-Tech Biology Co. Ltd.	E
FlouroChem Ltd.	R,E	Shanghai Freemen International Trading Co. Ltd.	R,E
Functional Foods Corp.	R,E	Shanghai Wenda Biotech Inc.	E
GCI Nutrients	E	Starwest Botanicals Inc.	R,E
Gee Lawson Nutritional	R,E	SPC Pharma Inc.	E
Gourmet Nutrition	R,E	Suan Farma Inc.	E
Green Biochemicals Inc.	E	TCD China	R
GuiLin Natural Ingredients Inc.	E	To Your Health	R,E
Hainan Zhongxin Chemical Co. Ltd.	E	Trusperity USA Inc.	R,E
Harten Corp.	R,E	U.S. Nutraceuticals LLC	E
Health4All Products Ltd.	P	Unipharm Co. Ltd	E
Herbalist & Alchemist	R	Vedic Lifesciences	R,E,C
Herbco International Inc.	R	Watson Industries Inc.	E,P
Honson Ingredients Ltd.	E	Western Herb Products	P
Huazhong Pharmaceutical Co. Ltd.	E	Yerbalatina Phytoactives/Healthbrands Inc.	E
Wonder Trading USA Inc.	R	Zhejiang Conba Pharmaceutical Co. Ltd.	E
		Zhejiang Medicines & Health Products I/E Co. Ltd.	R

5.12.9 Barriers to Entry – Wild yam

About eight years is required for Wild yam to go from seed to a harvestable commodity. Low prices and abundant competition from similar species are the highest barriers to this market. Also, seed is commercially unavailable for this material.

5.12.10 Distribution Channels – Wild yam

General brokers handle most transactions. The bioactive components of this material are very similar to other species within the genus. Therefore, brokers and direct buyers are more concerned with diosgenin levels than the specificity of the species.

5.12.11 Key Customer Requirements – Wild yam

Freshness is a key requirement. Unused supplies must be discarded due to a deterioration of the bioactive constituents. Acceptable bioactive content is generally viewed as diosgenin levels approaching 6%.

5.12.12 Recent Developments – Wild yam

Some interest has been renewed in the scientific community concerning Wild yam's potential uses as a HRT.

5.12.13 Commercial Viability – Wild yam

Of the top nutraceutical/botanical companies in North America and Europe, 21% offer this material as a stand-alone product and 35% offer this material either as a stand-alone product or as part of a multi-constituent supplement.

5.12.14 Suitability to North Carolina Cultivation – Wild yam

Wild yam is native to North Carolina and will grow in the central regions of the state.

5.12.15 Overall Assessment – Wild yam

The market potential for this material depends on clinical trials involving its viability as an HRT. Long seed-to-harvest times and a price that trades in

a very low band relative to the target group are key negatives for its prospects as a candidate for cultivation. Competition from abundant wild populations of plants in the same genus will greatly reduce the profit potential of cultivating this material.

Annual market growth for this material should be in the range of five-to-ten percent over the next three-to-five years. Prices will continue to trade between $3-$6 dollars (per pound) for the foreseeable future as competition from within the species and from other natural sources of diosgenin, such as fenugreek, restricts any significant price appreciation of this material.

in manufactured products. Of the 15 respondents using or buying American ginseng material(s):

Form Purchased *Multiple Forms Possible*			**Cultivated** *More than One Possible*			**Wild Harvested**	
Whole Root	Extract	Powder	Wild Sim.	Woods Grwn.	Field Cult. (Artfl. Shade)	Yes	No
47%	40%	40%	7%	20%	47%	13%	87%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
20%	36%	44%	25%	75%	67%	33%	0%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
17%	58%	25%	0%	66%	66%	0%	0%

Annual Usage			**Willing to Buy Direct**	
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No
46%	36%	18%	93%	7%

Future Demand Prospects																				
Increasing- 57%											Decreasing- 21%									Constant 22%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
43 %	7 %	7 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	14 %	7 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Black cohosh: Of the 21 surveyed companies, 18, or over 85%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 18 respondents using or buying Black cohosh material(s):

Form Purchased *Multiple Forms Possible*				**Cultivated or Wild Harvested**		
Whole Root	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
50%	43%	39%	22%	33%	17%	50%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
11%	67%	22%	70%	30%	31%	38%	31%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
19%	44%	31%	6%	55%	50%	28%	11%

Annual Usage			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
12%	57%	31%	83%	5%	12%

Future Demand Prospects																				
Increasing- 67%											Decreasing- 18%									Constant 15%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
16 %	33 %	16 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	6 %	6 %	6 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Bloodroot: Of the 21 surveyed companies, 4, or about 19%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 4 respondents using or buying Bloodroot material(s):

Form Purchased *Multiple Forms Possible*				**Cultivated or Wild Harvested**		
Whole Root	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
75%	0%	0%	25%	0%	75%	25%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
0%	50%	50%	0%	100%	75%	25%	0%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
50%	50%	0%	0%	75%	50%	0%	0%

Annual Usage			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
66%	34%	0%	100%	0%	0%

Future Demand Prospects																					
Increasing- 50%											Decreasing- 0%										Constant 50%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %		
25 %	25 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %		

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

False unicorn: Of the 21 surveyed companies, 8, or about 38%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 8 respondents using or buying False unicorn material(s):

Form Purchased *Multiple Forms Possible*				**Cultivated or Wild Harvested**		
Whole Root	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
75%	0%	38%	38%	0%	38%	62%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
0%	75%	25%	28%	72%	75%	25%	0%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
38%	50%	12%	0%	75%	38%	12%	0%

Annual Usage			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
57%	43%	0%	100%	0%	0%

Future Demand Prospects																				
Increasing- 50%											Decreasing- 38%									Constant 12%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
38 %	0 %	0 %	12 %	0 %	0 %	0 %	0 %	0 %	0 %	13 %	25 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Ginkgo biloba: Of the 21 surveyed companies, 17, or over 80%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 17 respondents using or buying Ginkgo biloba material(s):

Form Purchased *Multiple Forms Possible*				**Cultivated or Wild Harvested**		
Whole Leaf	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
41%	47%	35%	6%	94%	0%	6%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
6%	76%	18%	12%	88%	29%	47%	24%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
13%	53%	21%	13%	29%	53%	24%	12%

Annual Usage			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
25%	44%	31%	65%	12%	23%

Future Demand Prospects																				
Increasing- 53%											Decreasing- 18%									Constant 29%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
23 %	17 %	13 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	6 %	12 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Goldenseal: Of the 21 surveyed companies, 15, or over 71%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 15 respondents using or buying Goldenseal material(s):

Form Purchased *Multiple Forms Possible*					**Cultivated or Wild Harvested**		
Whole Root	Whole Herb	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
47%	13%	33%	53%	13%	36%	35%	29%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
29%	57%	14%	45%	55%	52%	41%	7%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
23%	38%	31%	8%	53%	53%	27%	6%

Annual Usage *(Root)*			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
30%	55%	15%	93%	0%	7%

Future Demand Prospects																				
Increasing- 54%											Decreasing-23%									Constant 23%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
38 %	8 %	8 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	15 %	8 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Narrow-leaf Purple Coneflower: Of the 21 surveyed companies, 11, or about 52%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 11 respondents using or buying Narrow-leaf Purple Coneflower material(s):

Form Purchased *Multiple Forms Possible*					**Cultivated or Wild Harvested**		
Whole Root	Whole Herb	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
54%	18%	27%	36%	18%	45%	18%	37%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
18%	54%	28%	50%	50%	45%	36%	19%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
9%	46%	36%	9%	36%	45%	18%	18%

Annual Usage *(Root)*			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
25%	12%	63%	91%	0%	9%

Future Demand Prospects																				
Increasing- 73%											Decreasing-9%									Constant 18%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
45 %	19 %	9 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	9 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Pale Purple Coneflower: Of the 21 surveyed companies, 3, or about 14%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 3 respondents using or buying Pale Purple Coneflower material(s):

Form Purchased *Multiple Forms Possible*					**Cultivated or Wild Harvested**		
Whole Root	Whole Herb	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
100%	0%	0%	0%	0%	66%	0%	34%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
34%	66%	0%	34%	66%	50%	0%	50%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
66%	0%	0%	34%	66%	66%	0%	0%

Annual Usage *(Root)*			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
50%	0%	50%	100%	0%	0%

Future Demand Prospects																				
Increasing- 34%											Decreasing-33%									Constant 33%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
34 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	33 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Purple Coneflower: Of the 21 surveyed companies, 10, or about 48%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 10 respondents using or buying Purple Coneflower material(s):

Form Purchased *Multiple Forms Possible*					**Cultivated or Wild Harvested**		
Whole Root	Whole Herb	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
70%	40%	10%	30%	10%	100%	0%	0%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
60%	30%	10%	50%	50%	44%	34%	22%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
10%	50%	20%	20%	70%	30%	20%	0%

Annual Usage *(Root)*			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
43%	28%	29%	90%	0%	10%

Future Demand Prospects																				
Increasing- 50%											Decreasing-30%									Constant 20 %
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
40 %	10 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	10 %	10 %	0 %	10 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Skullcap: Of the 21 surveyed companies, 10, or about 48%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 10 respondents using or buying Skullcap material(s):

Form Purchased *Multiple Forms Possible*					**Cultivated or Wild Harvested**		
Leaf	Whole Herb	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
10%	70%	10%	20%	20%	80%	10%	10%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
60%	30%	10%	70%	30%	38%	50%	12%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
22%	33%	33%	12%	55%	55%	11%	11%

Annual Usage			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
43%	14%	43%	90%	0%	10%

Future Demand Prospects																					
Increasing- 89%											Decreasing-0%										Constant 11 %
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
55 %	11 %	12 %	11 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Wild indigo: Of the 21 surveyed companies, 4, or about 19%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 4 respondents using or buying Wild indigo material(s):

Form Purchased *Multiple Forms Possible*				**Cultivated or Wild Harvested**		
Whole Root	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
100%	0%	0%	0%	0%	50%	50%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
0%	50%	50%	0%	100%	100%	0%	0%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
25%	75%	0%	0%	50%	50%	0%	0%

Annual Usage			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
100%	0%	0%	100%	0%	0%

Future Demand Prospects																				
Increasing- 25%											Decreasing- 50%									Constant 25%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
25 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	25 %	25 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Wild yam: Of the 21 surveyed companies, 14, or about 67%, reported purchasing some form(s) of this material for direct resale or for use in its manufactured products. Of the 14 respondents using or buying Wild yam material(s):

Form Purchased *Multiple Forms Possible*				**Cultivated or Wild Harvested**		
Whole Root	Extract	Powder	Cut & Sift	Cultivated	Wild Harvest	Both
50%	36%	50%	36%	36%	36%	28%

Organic Certification			**Bioactive Requirement**		**Typical Lot Size**		
Yes	No	Sometimes	Yes	No	< 100 kgs	100 kgs - 500 kgs	> 500 kgs
21%	71%	8%	29%	71%	42%	58%	0%

Minimum Order Quantity				**Supplied By:** *Multiple Sources Possible*			
Any	< 100 kgs	100 kgs - 500 kgs	> 500 kgs	Direct from Grower/ Harvester	Specialized Herbal Supplier	Broker	Other
21%	43%	36%	0%	29%	79%	36%	7%

Annual Usage			**Willing to Buy Direct**		
< 100 kgs	100 kgs - 1000 kgs	> 1000 kgs	Yes	No	Not Sure
27%	64%	9%	93%	7%	0%

Future Demand Prospects																				
Increasing- 72%											Decreasing- 7%									Constant 21%
< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	< 10 %	10 to 20 %	20 to 30 %	30 to 40 %	40 to 50 %	50 to 60 %	60 to 70 %	70 to 80 %	80 to 90 %	> 100 %	
43 %	14 %	15 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	7 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	

Of the four respondents to the question as to whether their company purchases any botanicals grown in North Carolina, one responded in the affirmative with the following list: American Botanicals - Witch Hazel Bark/ Leaf, Wild ginseng.

Company Profiles

A.M. Todd Group
www.amtodd.com

Company Background

Founded in 1869, A. M. Todd Company pioneered quality and purity for the mint industry. Today, the company is the largest supplier of natural peppermint and spearmint oils in the world. The incorporation of Folexco in 1988 added botanical extracts to the company's portfolio of products. This segment of the company was further expanded with the purchase of East Earth Herb, Inc. in 1999. The company operates two full-service botanical facilities in Pennsylvania and Oregon, which combined have the capacity to process in excess of 100 tons of botanical raw material every month. Headquartered in Kalamazoo, Michigan, A. M. Todd Group maintains offices in the United Kingdom, India, Mexico and Argentina.

Number of Employees: 900 - 1200

Recent News

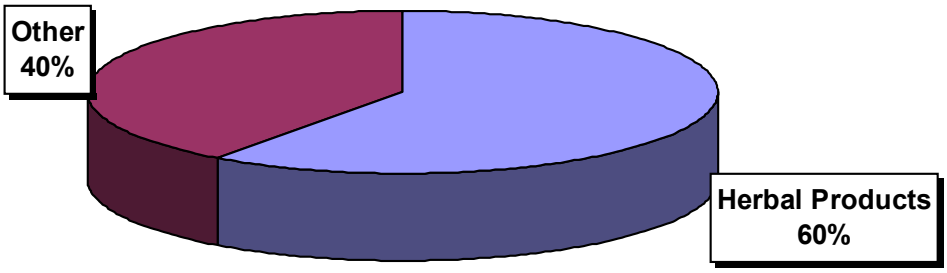
October 2000

The company sold Flavorite Laboratories Inc. of Horn Lake, Illinois, to Newly Weds Foods Inc., a producer of food coatings, seasonings and ingredients for the food processing and food-service industries, for an undisclosed amount. A.M. Todd purchased the company in 1985, expanding its sales revenue to $54 million in 2000 while employing about 225 people.

Distribution Channels

The firm is a wholesale supplier of spearmint and peppermint oils, along with botanical extracts to the food, beverage, flavor, fragrance, cosmetic, dietary supplement and nutraceutical industries. In 2001, about 60% of sales revenues were generated through the sale of botanical extracts.

2001 Revenues by Product Segment



Sales

Net sales in 2001 were between $200 million and $300 million.

Products

Brand Names- PhytoSpectrum Extracts, Astragamax, Echinamax

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Echinacea angustifolia, Echinacea purpurea, Ginkgo biloba, Goldenseal, Skullcap, Wild yam

Contacts

Corporate Headquarters: A. M. Todd Company
1717 Douglas Avenue
Box 50711
Kalamazoo, MI 49005
800-968-2603

Aceto Corporation
www.aceto.com

Company Background

Aceto (Nasdaq: ACET), headquartered in Lake Success, New York, is a global leader in the distribution and marketing of pharmaceutical and specialty chemicals used in the agricultural, color producing, pharmaceutical and surface coating industries. The company is organized into five reportable segments organized by product:

- Agrochemicals - products include herbicides, fungicides, and insecticides
- Chemicals and Colorants - products include specialty chemicals used in adhesives, coatings, food, fragrances and cosmetics
- Pharmaceuticals, Biochemicals and Nutritional Products - distributes active ingredients for generic drugs, vitamins and nutritional supplements
- Pharmaceutical Intermediates Custom Manufacturing Products - distributes items used in the preparation of pharmaceuticals
- Institutional Sanitary Supplies/Other - products include cleaning solutions, fragrances and deodorants used by commercial and industrial customers. The company has custom manufacturing facilities in China.

Number of Employees: 240

Recent News

March 2001

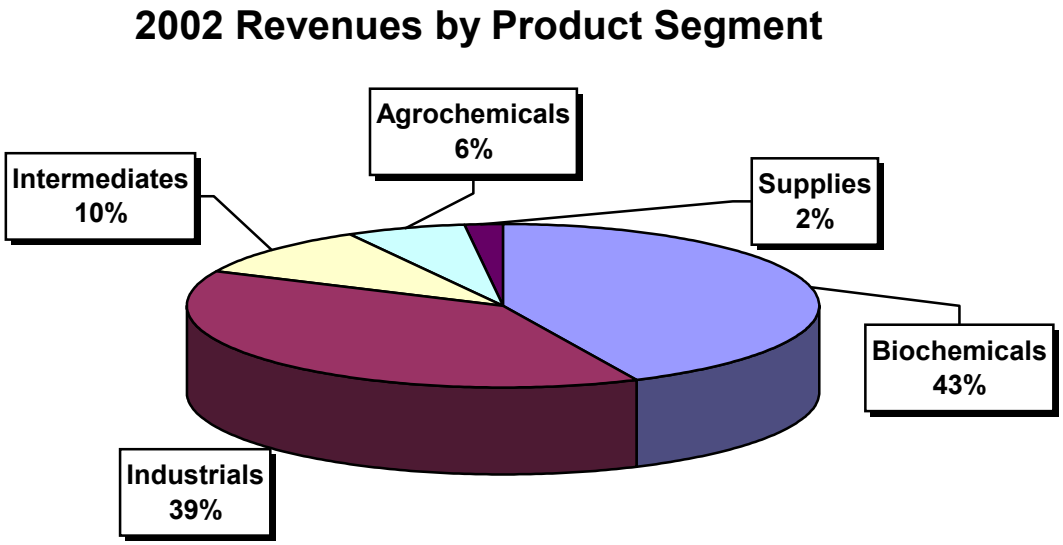
The firm announced the acquisition of the Schweizerhall Pharma Division, a division of Schweizerhall Holdings AG of Switzerland, for about $26 million.

January 2000

The company acquired the business unit of Schweitzerhall Holding AG responsible for the trading of chemical raw materials used in the production of vitamins and food supplements. The purchase price was $6.3 million.

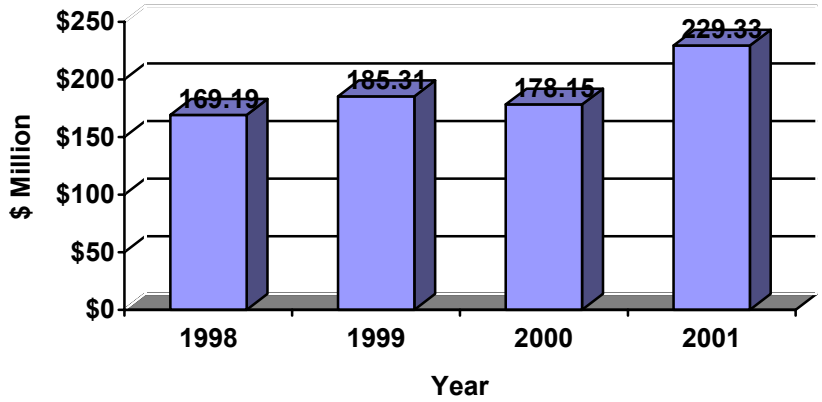
Distribution Channels

Aceto claims to be the largest independent distributor of pharmaceutical and nutritional chemicals in the United States and the third largest in the world. The company has operations in the United States, Europe and Asia. Biochemicals accounted for 43% of fiscal 2002 revenues.



Sales

Net sales in 2001 were approximately $229 million. This represents a 28.6% increase over 2000 results.



Products

Target Botanicals used in Herbal Products- American ginseng, Ginkgo biloba, Echinacea purpurea

Contacts

Corporate Headquarters:

Aceto Corporation
One Hollow Lane, Suite 201
Lake Success, NY 11042
Phone: 516-627-6000

Bayer AG
www.bayer.com

Company Background

Bayer AG (NYSE: BAY), headquartered in Leverkusen, Germany, is a manufacturer and distributor of chemical and healthcare products throughout the world. The company's major businesses include the following:

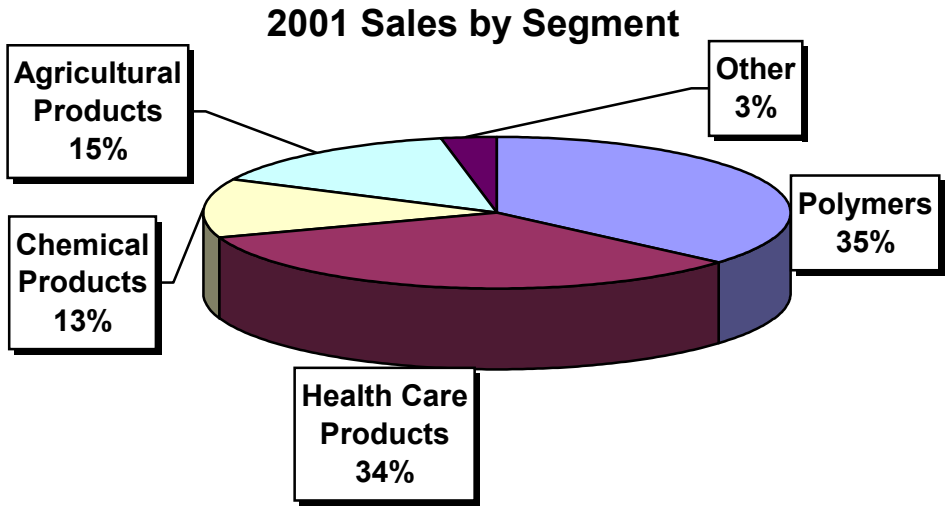
- Polymers - plastics, rubber, polyurethane, coatings and colorants
- Health Care Products - pharmaceuticals, consumer care, biological products and diagnostics
- Chemical Products - basic and fine chemicals, and specialty products
- Agricultural Products - crop protection and animal health

In 1994, Bayer Consumer Care was created as an independent business group and is one of the largest suppliers of over-the-counter (OTC) medications in the world.

Number of Employees: 5,478 (Consumer Care Division)

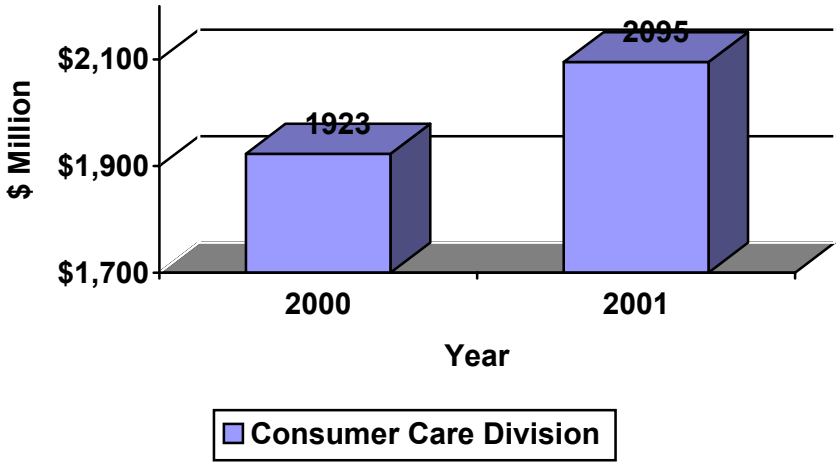
Distribution Channels

The Consumer Care Division operates in over 90 countries offering a wide range of branded products throughout all distribution channels. Health Care Products accounted for 34% of sales revenues for the company as a whole in 2001.



Sales

Net sales in 2001 were about $2.095 billion for the Consumer Care Division. This amount represents a 8.9% increase over 2000 results.



Products

Brand Names- One-A-Day Memory & Concentration, One-A-Day Energy

Target Botanicals used in Herbal Products- American ginseng, Ginkgo biloba

Contacts

Corporate Headquarters: Bayer AG
Werk Leverkusen
51368 Leverkusen
Germany
Phone: +49 214 301

Bell Flavors & Fragrances, Inc.

www.bell-europe.com

Company Background

Bell Flavors & Fragrances, headquartered in Northbrook, Illinois, develops products for leading food and beverage and cosmetics companies throughout the world. Over the years, the company has acquired 16 different flavor and fragrance businesses. These acquisitions have brought the company expertise in areas such as fragrances, aroma chemicals, botanicals and natural extracts. The company manufactures products at seven locations in the following five countries: Canada, China, Germany, Mexico and the United States.

Number of Employees: United States - 175, International - 400

Recent News

September 2001

The company announced the purchase of EIGSA, a flavor and fragrance company located in Guadalajara, Mexico, for an undisclosed amount.

Sales

Sales in 2001 were $50 million to $100 million.

Products

Target Botanicals used in Herbal Products- American ginseng, Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

Bell Flavors and Fragrances
500 Academy Drive
Northbrook, Illinois 60062
Phone: 847-291-8300

Bio-Botanica
www.bio-botanica.com

Company Background

Bio-Botanica is a leading developer and manufacturer of botanical extracts for the nutraceutical, food and beverage, cosmetics, and personal care industries. The company's product line includes over 300 botanical extracts offered in powdered, solid or tincture forms. Raw materials are gathered from all over the world and processed in facilities at Hauppauge, New York, using proprietary cold-processing extraction techniques. The company has 4500 acres of organic farmland under its control from which some of its raw materials are supplied.

Number of Employees: 110

Distribution Channels

Bio-Botanica is a wholesale supplier of floraceuticals, botanical extracts, cosmetic enhancers, pharmaceutical ingredients and homeopathic tinctures to the North American market.

Sales

Sales in 2001 were approximately $15 million to $25 million.

Products

Brand Names- Bio-Chelation, a proprietary cold-processing extraction technique used to preserve the active constituents of the raw material(s).

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal, Skullcap, Wild indigo, Wild yam

Contacts

Corporate Headquarters: Bio-Botanica
75 Commerce Drive
Hauppauge, NY 11738
516-231-5522

Bionorica Arzneimittel AG

www.bionorica.de

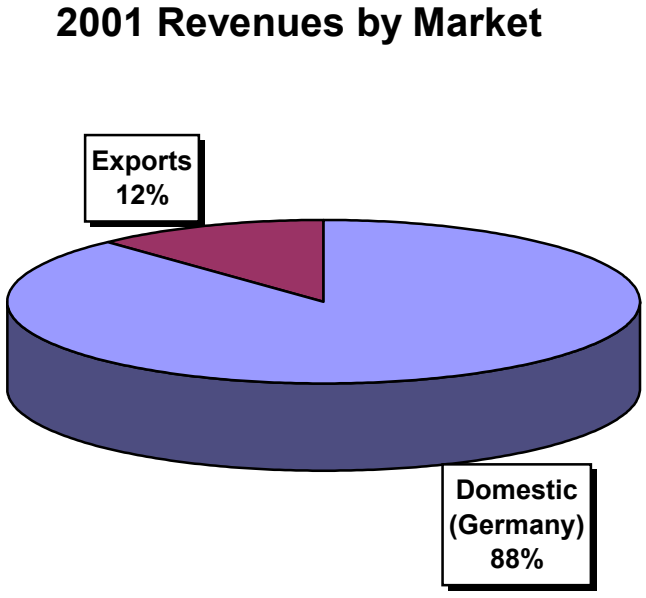
Company Background

Bionorica Arzneimittel AG, headquartered in Neumark, Germany, develops and manufactures botanical drugs using Good Manufacturing Processes (GMP). The company's product range focuses on diseases of the respiratory tract, gynecological disorders and medications for the treatment of pain. Development of herbal medicinal drugs is evaluated to the same standards as chemically synthesized drugs. Many products produced by Bionorica are prescribed by doctors while others are sold on the over-the-counter market.

Number of Employees: 300

Distribution Channels

Bionorica distributes products in foreign markets through subsidiaries and contracted partners. The company's products are currently available in over 50 countries throughout the world. Products sold in the domestic market (Germany) accounted for 88% of 2001 revenues.



Sales

Estimated sales revenues in 2001 were $30 million to $50 million.

Brand Names- Klimadynon, Mastodynon

Target Botanicals used in Herbal Products - Black cohosh, Echinacea angustifolia

Contacts

Corporate Headquarters:

Bionorica Arzneimittel AG
Kerschensteinerstrasse 11-15
D-92318 Neumark
Germany
Phone: +49 (0) 9181 / 231-192

Boehringer Ingelheim GmbH

www.boehringer-ingelheim.com

Company Background

Boehringer Ingelheim is a privately held corporation headquartered in Ingelheim, Germany. The company maintains a high-profile global presence in over 60 countries marketing and manufacturing prescription medicines, consumer healthcare products, chemicals and animal health products. The Consumer Health Care Business Segment is one of the core businesses of the group, as the firm ranks as one of the top ten manufacturers of over-the-counter (OTC) drugs in the world.

Number of Employees: 27,980

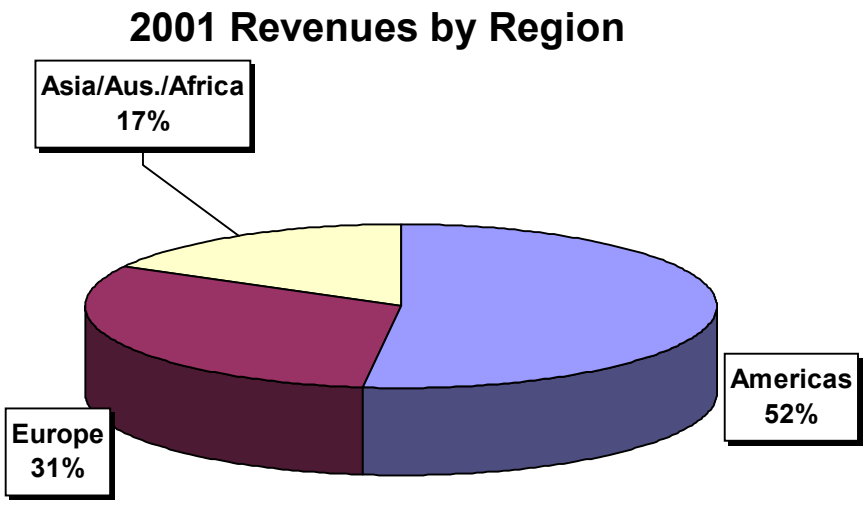
Recent News

November 2001

The firm announced the acquisition of a majority share ownership in SSP of Japan. The company views a controlling interest in SSP as vital to its strategy of launching new products and marketing drugs moving from the prescription to the OTC market.

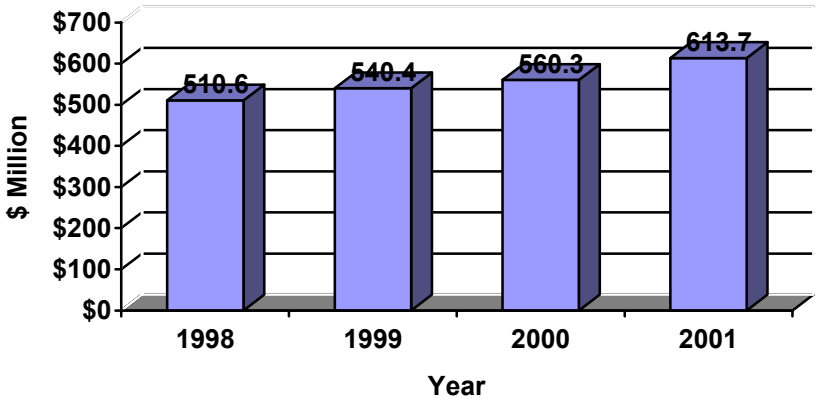
Distribution Channels

The company distributes products to retail customers on a worldwide basis through the Pharmaton Natural Health Products brand name. Brand recognition begins in the prescription arena and moves through the product life cycle until it reaches maturity in the OTC market. The strongest market geographically for the company was the Americas, accounting for 52% of 2001 sales revenues.



Sales

Net sales in 2001 for the Consumer Health Care Segment were approximately $613 million, a 9.6% increase over 2000 results.



Products

Brand Names- Ginsana, Ginkoba, Evana, Menofem, Venastat, Antisax, Prostatonin

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba

Contacts

Corporate Headquarters:

Boehringer Ingelheim GmbH
Binger Strasse 173
D-55216 Ingelheim am Rhein
Germany
Phone: +49/6132/77-2093

Boiron SA
www.boiron.com

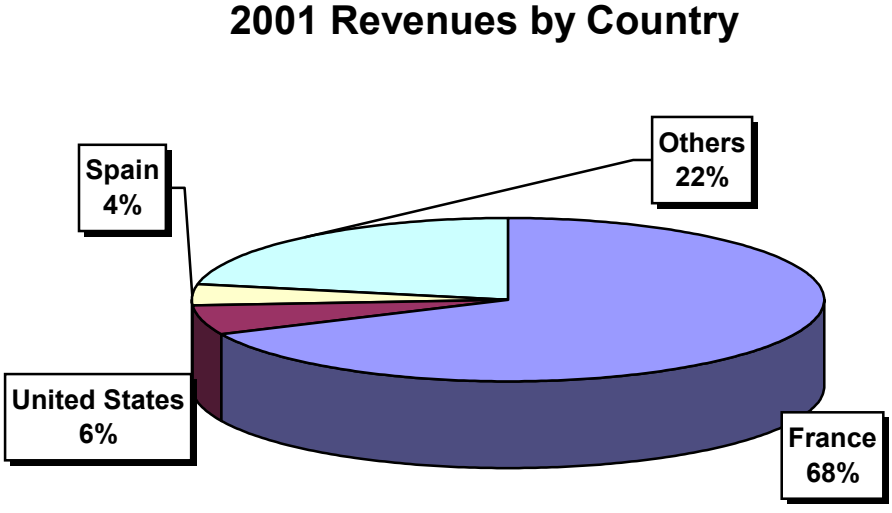
Company Background

Boiron SA, headquartered in Sainte-Foy-les-Lyon, France, manufactures homeopathic medicines and other health products, including nutritional supplements, trace elements and herbal remedies. In France, the company maintains three industrial production facilities along with 29 production and distribution centers. Industrial and commercial facilities are also located in the United States, Canada, Spain, Belgium, Italy and the Caribbean.

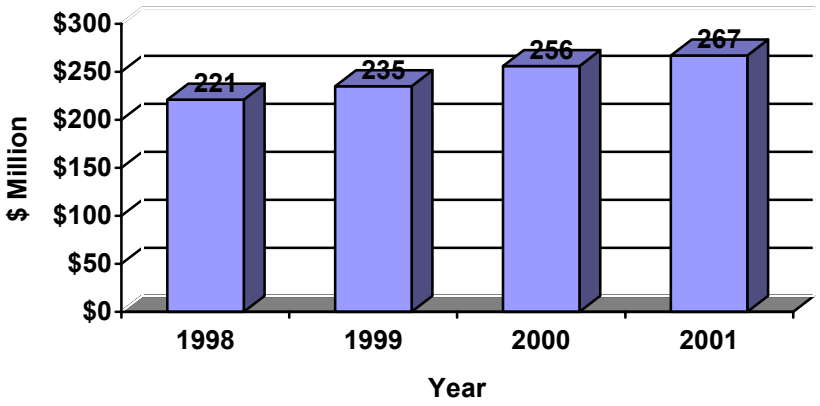
Number of Employees: 2,270

Distribution Channels

In France, more than 20,000 pharmacies have direct access to the company's 29 distribution facilities. In other countries in Western Europe and North America, subsidiaries have been set up to serve 16 distinct regional territories. The company derives most revenues from its home market. In 2001, France accounted for 68% of the company's total sales.



Net sales in 2001 were approximately $267 million, a 4.3% increase over 2000 results.



Products

Target Botanicals used in Herbal Products - Black cohosh, Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

Boiron SA
69110 Sainte-Foy-les-Lyon
France

Phone: +33 4 72 16 40 00

Brucia Plant Extracts
www.brucia.com

Company Background

Brucia Plant Extracts, founded in 1975 and located in Shingle Springs, California, supplies quality botanical extracts to the herb, dietary supplement, nutraceuticals and natural food industries. The company has the ability to produce over 1,000 extracts in powder and liquid form. Brucia Plant Extracts provides both standardized extracts and whole plant extracts, depending on the needs of the customer.

Number of Employees: 50

Recent News

June 2002

The company was acquired by Naturex SA of France, a producer of natural extracts from plants and vegetables, for an undisclosed amount. The company is now known as **Brucia-Naturex** and operates as a fully owned subsidiary of Naturex SA.

Products

Brand Names- Theraplant Standardized Extracts

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Echinacea angustifolia, Echinacea purpurea, False unicorn, Goldenseal, Ginkgo biloba, Goldenseal, Skullcap, Wild yam

Contacts

Headquarters: Brucia Plant Extracts
3855 Dividend Drive
Shingle Springs, CA 95682
Phone: 530-676-2774

Cederroth International AB
www.cederroth.com

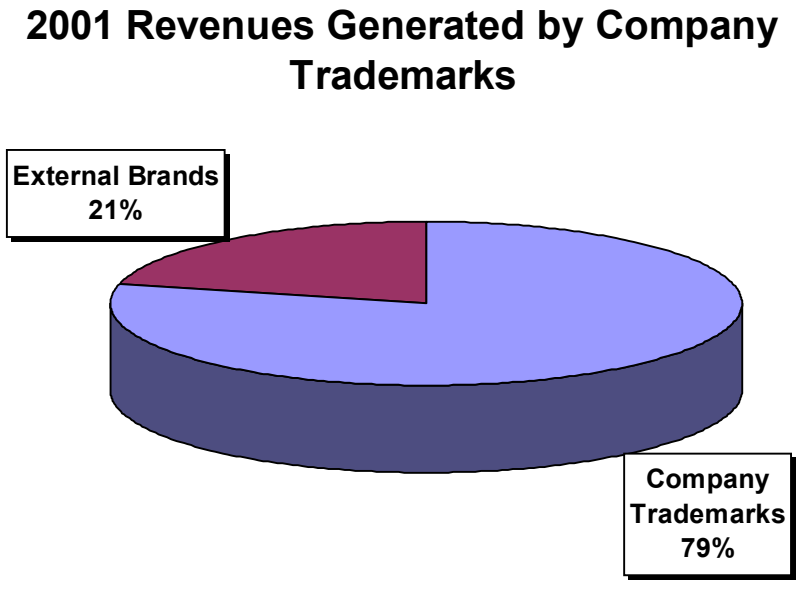
Company Background

Cederroth International, headquartered in Stockholm, Sweden, manufactures and sells products in the toiletries, health and wound care, and household and first aid markets. The majority of the company's products are manufactured in Swedish factories located in Falun, Upplands Vasby and Gothenburg. Cederroth International is a subsidiary of the Alberto Culver Company located in Melrose Park, Illinois. It operates as an Independent Business Unit (IBU) of Alberto Culver.

Number of Employees: 784 (Cederroth IBU)

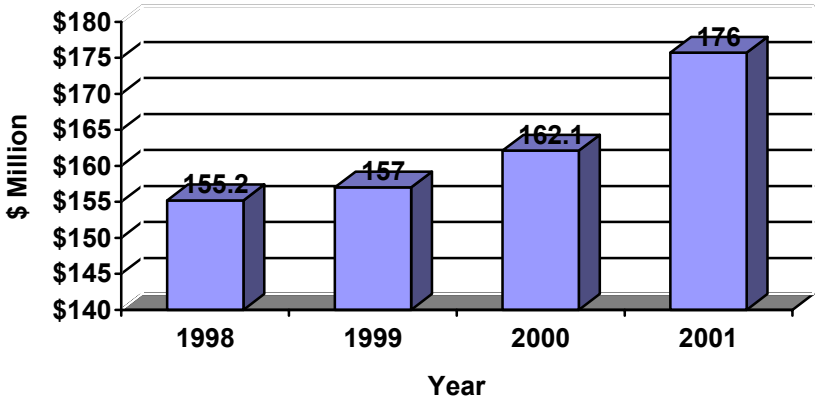
Distribution Channels

The Cederroth IBU distributes products through its own subsidiaries and through contracted business partners overseas. Natural pharmaceuticals are distributed by Pharbio Medical International, a wholly owned subsidiary of the company. In 2001, the company's trademarks accounted for 79% of total sales.



Sales

Net sales in 2001 for the Cederroth IBU were about $176 million, an 8.4% increase over 2000 results.



Products

Brand Names- Revetonil, Seredrin, Samarin, Curbicin, Valerina, Uvalett

Target Botanicals used in Herbal Products- Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

Cederroth International AB
Box 715
S-194 27 Upplands Vasby
Sweden

Phone: +46 8 590 96 300

Pharbio Medical International:

Box 30060
SE-400 43 Gothenburg
Sweden

Phone: +46 31 49 01 95

Chai-Na-Ta Corporation
www.chainata.com

Company Background

Chai-Na-Ta Corporation (OTC BB: CCCFF), headquartered in Langley, British Columbia, is the world's largest supplier of American ginseng. The company farms, processes and distributes American ginseng as bulk root, and supplies powdered extract to manufacturers of finished ginseng products. As of December of 2001, the company had 360 acres in Ontario and 979 acres in British Columbia under cultivation.

Number of Employees: 150

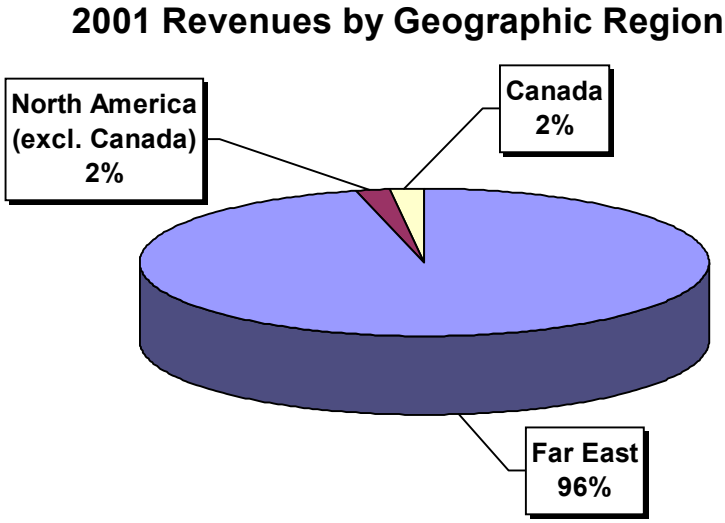
Recent News

December 2002

China's entry into the World Trade Organization will reduce tariffs on imported American ginseng into the country from 36% to 12%.

Distribution Channels

The largest market for American ginseng is China, accounting for over 90% of the industry's consumption. In 2001, 96% of the company's sales revenues came from the Far East markets.



Sales

Net sales in 2001 were approximately $13.9 million.

Products

Target Botanicals used in Herbal Products- American ginseng

Contacts

Corporate Headquarters:

Chai-Na-Ta Corporation
5965 205A Street
Langley, British Columbia
V3A 8C4

Phone: 604-533-8883

Cognis GmbH&Co.KG

www.cognis.com

Company Background

The Cognis Group, a specialty chemicals company, is one of the world's largest producers of oleochemicals and derivatives. The German company, formerly a subsidiary of Henkel Group, was set up as a separate financial entity by Henkel in 1999 and sold to outside investors in September 2001. The company has been structured into five strategic business units (SBU's): Oleochemicals, Care Chemicals, Nutrition & Health, Functional Products, and Process Chemicals. Included in the Nutrition & Health SBU (as of 2002) are the business segments of Dietary Supplements, Pharmaceuticals & Healthcare, Food Technology, Functional Food & Medical Nutrition, and Animal Nutrition.

Number of Employees: 9,065

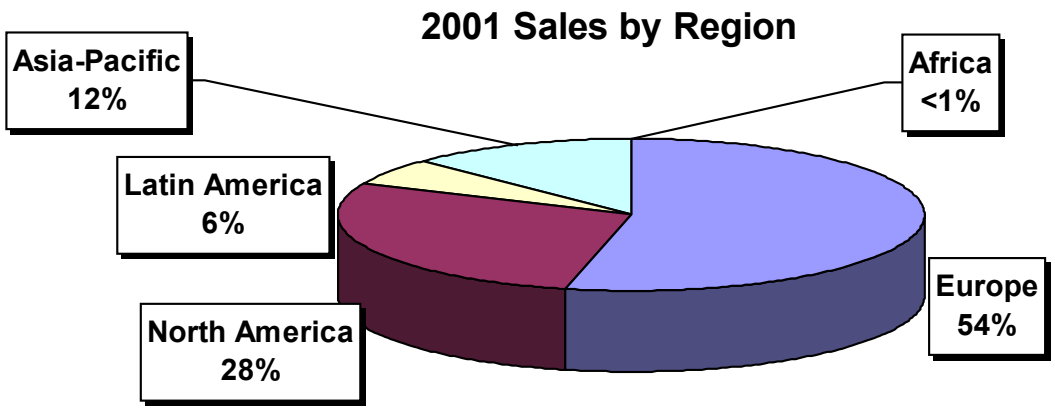
Recent News

May 2001

The company acquired Laboratorios Dr. Vinyals of Spain S.A., a producer of dry and purified plant extracts and licorice derivatives, for an undisclosed amount. Sales in 2000 were $12 million.

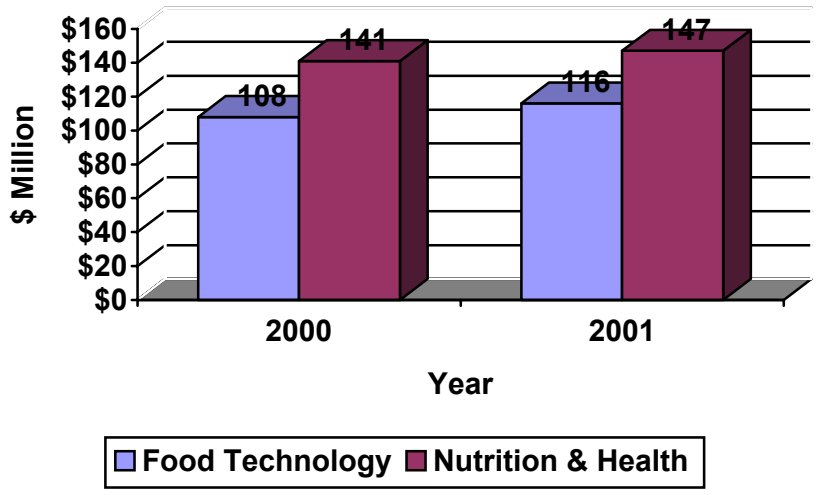
Distribution Channels

Cognis Nutrition and Health is a global supplier of extract products to a wide range of manufacturers and processors. Most of the business unit's output is sold to European concerns for finished processing into nutritional supplements and herbal medicines for consumption in domestic and export markets. The company does not provide regional sales data by SBU. For the company as a whole, 54% of 2001 sales took place in Europe.



Sales

Net sales in 2001 (prior to the introduction of the new SBU structure) were almost $263 million for the Nutrition & Health and Food Technology segments of the company combined. This amount is a 5.6% increase over year 2000 results.



Products

Brand Names (Business to Business) - Betatene, Botanical Specialties, Covitol, Covi-ox, Generol, Lipoec, Xangold

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Echinacea purpurea

Contacts

Corporate Headquarters:	Cognis Deutschland GmbH&co.KG Postfach B 01 64 D-40551 Dusseldorf Germany +49 211 7940 4089
North American Headquarters:	Cognis Corp. USA 5051 Estecreek Drive Cincinnati, OH 45232-1446 800-254-1029
Nutrition & Health (USA)	Paul Allen Vice President 513-482-3004 PaulAllen@Cognis-US.com

Degussa Health & Nutrition
www.degussa-bioactives.com

Company Background

Degussa Health & Nutrition operates as a division of Germany's third-largest chemical company, Degussa AG of Germany. The Division's various business activities are carried out by four Business Units (BU): Flavors & Fruit Systems, BioActives, Feed Additives and Texturant Systems. Each BU maintains its own research facilities around the world connected through a global information network of "Application Service Centers".

Degussa BioActives is one of the largest manufacturers and distributors of nutritional products and herbal extracts in the world. Recently, the BioActives BU consolidated the operations of four components in its Health Ingredients Business (Lucas Meyer, SKW Biosystems, SKW Trostberg and Traco Labs Inc.) in an attempt to cut costs and improve efficiencies. The Feed Additives BU is one of the largest suppliers of additives for food and animal feed in the world.

Number of Employees: 3,500 (Degussa Health & Nutrition Division)

Recent News

January 2002

Phytomedics Inc., a private biotechnology company, and Degussa AG entered into an agreement to co-develop, produce and market PMI-5011, a proprietary botanical healthcare product that has shown oral anti-diabetic activity.

November 2002

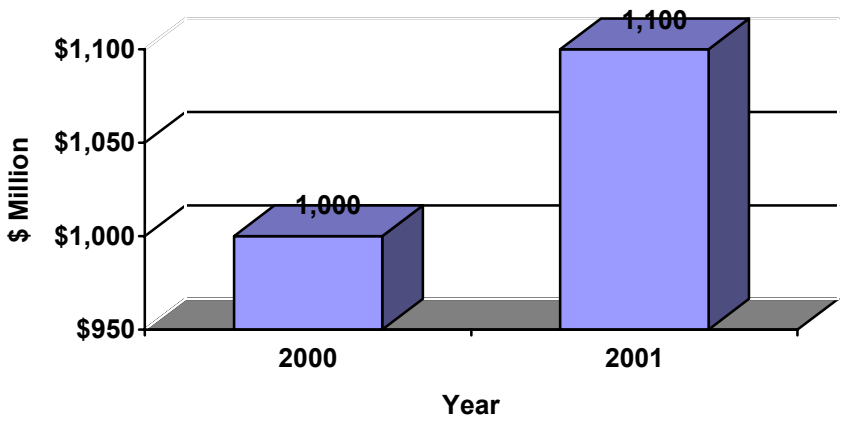
Degussa AG announced the formation of Degussa (China) Holding Company in Beijing with the intentions of expanding its foothold in the Chinese economy. The company generated about $190 million in revenues in China during fiscal year 2001.

Distribution Channels

Degussa AG distributes products globally through 22 BU's. The Health & Nutrition Division's employees are based in 46 locations in 21 countries around the world.

Sales

Net sales in the Health & Nutrition Division were approximately $1.1 billion in 2001, a 10% increase over 2000 results.



Products

Brand Names- Crea Pure, Cholestatin, Arthred, Leci-PS, Leci-Choline, Epikuron

Target Botanicals used in Herbal Products- Ginkgo biloba

Contacts

Corporate Headquarters: Degussa BioActives Deutschland GmbH
Siemensstrasse 13
59199 Bonen
Germany
Phone: +49 23 83 92 10 40

Dolisos Laboratories
www.dolisos.com

Company Background

Dolisos Laboratories, headquartered in Toulouse, France, is a subsidiary of the Pierre Fabre Group, a French pharmaceutical conglomerate specializing in plant-based medicines. The Dolisos Laboratories subsidiary and its operating divisions manufacture the distribute homeopathic medicines. The company provides over 3,000 single homeopathic remedies to the general public. Dolisos America Inc. offers a variety of private label and custom manufacturing opportunities to distributors.

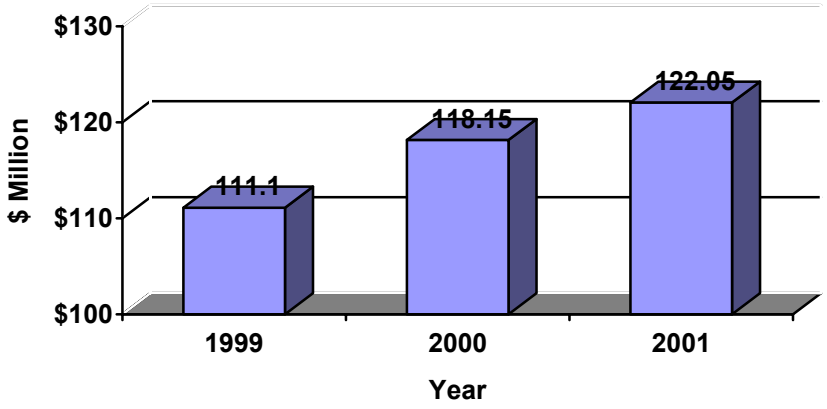
Number of Employees: 780

Distribution Channels

Dolisos Laboratories distributes products manufactured in the Loire region of France to 23 distribution centers in France and subsidiaries in Europe. Dolisos America Inc. manufactures homeopathic medicines that are sold in the United States at a facility located in Las Vegas, Nevada.

Sales

Net sales in 2001 for Dolisos Laboratories were approximately $122 million.



Products

Brand Names- Flu Solution, Dolicoccil Flu Solution Plus, Dolivaxil, Dolisinus, Boripharm, Poconeol

Target Botanicals used in Herbal Products- Black cohosh, Bloodroot, Echinacea purpurea

Contacts

Corporate Headquarters:	Dolisos Laboratories 45 Pl Abel Gance 92100 Boulogne Billancourt France Phone: 01 49 10 80 00
U.S. Division:	Dolisos America Inc. 3014 Rigel Avenue Las Vegas, NV 89102 Phone: 702-871-7153

Dr. Willmar Schwabe GmbH & Co.

www.schwabe.de

Company Background

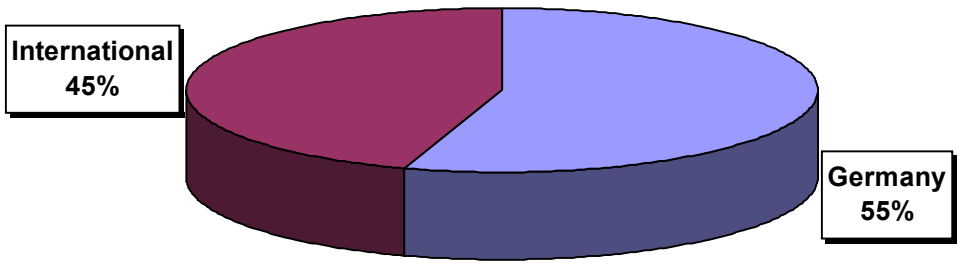
Dr. Willmar Schwabe Pharmaceuticals, headquartered in Karlsruhe, Germany, is one the leading manufacturers of phytomedicines in the world. In 1969, the company entered into a strategic partnership with the French company Beaufour Ipsen. The partnership produced the Ginkgo biloba special extract EGb 761. The incorporation of Spitzner, Farmasan, CuraMED, Extracta, DHU and JSO in Germany, in addition to the creation of foreign subsidiaries and joint ventures, form The Schwabe Group.

Number of Employees: 3,000

Distribution Channels

The Schwabe Group distributes products throughout the world. 45% of 2000 sales revenues emanated from international markets. Nature's Way Inc., located in Springville Utah, is the company's main supplier of retail herbal and nutritional supplements in North America.

2000 Sales Revenues by Market



Sales

Sales revenue in 2001 was approximately $390 million. Of this amount, $294 million was from the sale of phyto-pharmaceutical products.

Products

Brand Names- EGb 761, Nature's Way

Target Botanicals used in Herbal Products- Black cohosh, Echinacea purpurea, Ginkgo biloba, Goldenseal, Skullcap, Wild yam

Contacts

Corporate Headquarters: Dr. Willmar Schwabe Group
Willmar-Schwabe-Strasse 4
76227 Karlsruhe, Germany

Phone: +49 (0) 7 21 40 05 1 01

Draco Natural Products
www.dracoherbs.com

Company Background

Draco Natural Products, based in San Jose, California, is a leader in the supply of quality powdered botanical extracts for the nutritional supplements, functional foods and personal care markets. The herbs used in the company's more than 500 extract products are sourced from all over the world. Draco does not use any alcohol or chemical solvents in its cold-extraction processes. As a result, all of the company's products are water-soluble and, due to a unique spray-drying procedure, carrier free.

Number of Employees: 120

Recent News

April 2001

The company announced that it has earned certification into the ISO 9001 series for international quality standards.

Sales

Net sales in 2001 were about $10 million.

Products

Brand Names- Full Spectrum Standardized Herbal Extracts, Action-Synergized Formulations

Target Botanicals used in Herbal Products- Black cohosh, Ginkgo biloba

Contacts

Corporate Headquarters:

Draco Natural Products, Inc.
539 Parrott Street
San Jose, CA 95112
408-287-7871

Emil Flachsmann AG

www.flachsmann.ch

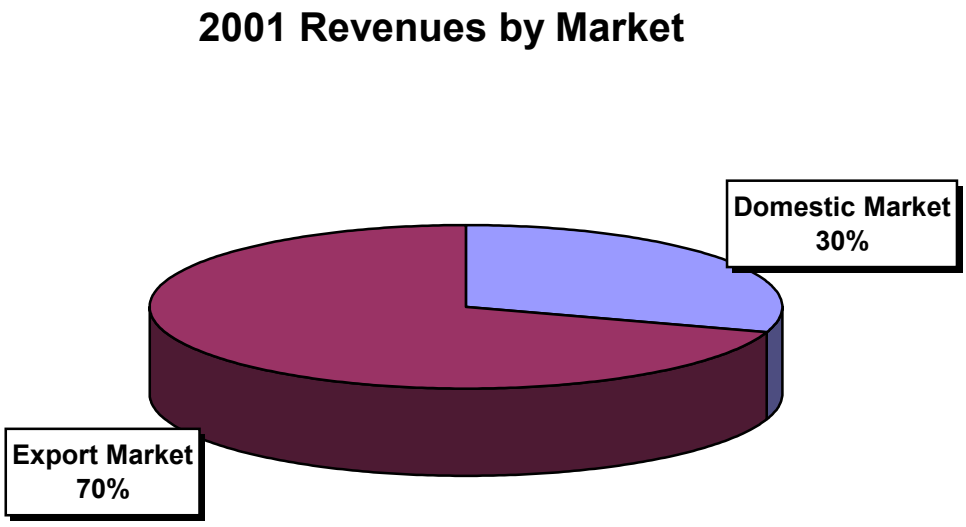
Company Background

Emil Flachsmann AG, headquartered in Zurich, Switzerland, is a family-owned company with over 65 years of experience in the manufacturing and testing of flavors for the food industry. It also focuses on the production of specially developed herbal extracts for the pharmaceutical industry.

Number of Employees: 150 - 250

Distribution Channels

The company does business in over 60 countries worldwide through a network of subsidiaries, agents and contracted partners. 70% of 2001 sales revenues were generated through the export market.



Sales

Net sales in 2001 were approximately $80 million to $100 million.

Products

Target Botanicals used in Herbal Products- American ginseng, Echinacea purpurea

Contacts

Corporate Headquarters:

Emil Flachsmann AG
Rutiwisstrasse
8820 Wadenswil (Zurich)
Switzerland

Phone: 41 (0) 1 782 64 64

eXxentia
www.exxentia.com

Company Background

eXxentia is a European manufacturer of dry extracts from carefully selected medicinal plants. The company uses a cold, spray-drying technique ensuring that the extract produced preserves all the chemical characteristics of the underlying plant. The company has processed over 160 different extracts.

Number of Employees: < 100

Sales

Sales in 2001 were in the range of $10 million to $20 million.

Brand Names- eXxentia

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Echinacea purpurea, Ginkgo biloba, Goldenseal

Contacts

Corporate Headquarters:

ExXentia SA
Camino de Hormigueras 176
28031 Madrid

Phone: +34 91 7788686

Jean Marie Raymond
Export Manager

Ferrosan AS
www.ferrosan.com

Company Background

Ferrosan AS, headquartered in Soeborg, Denmark, is a healthcare company that develops, produces and markets pharmaceuticals, natural remedies, vitamin and mineral products, herbal medicines, and medical devices primarily to the over-the-counter market. The company has entered into strategic business alliances resulting in representation in more than 70 countries around world.

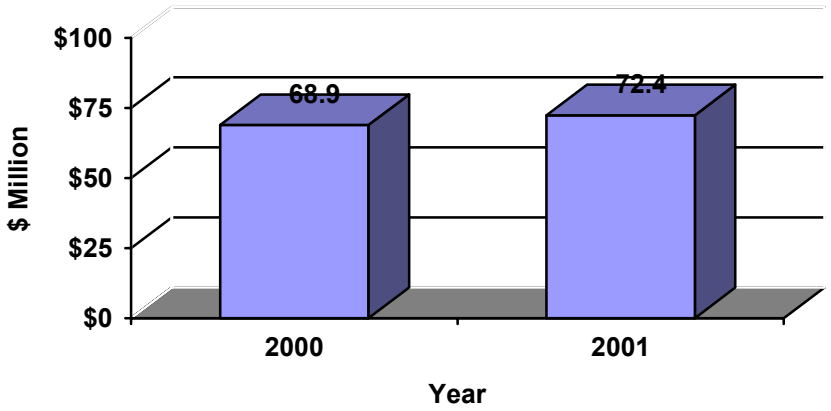
Number of Employees: 340

Distribution Channels

Ferrosan trades with more than 200 vendors on a worldwide basis and distributes products through subsidiaries and contracted business partners.

Sales

Net sales in 2001 were approximately $72 million. This amount represents a 4.9% increase over 2000 results.



Products

Brand Names- Angelika, Aquamid

Target Botanicals used in Herbal Products- American ginseng, Black cohosh

Contacts

Corporate Headquarters:

Ferrosan AS
Sydmarken 5
2860 Soeborg
Denmark

Phone: 34 965 43 61 33

Frontier Natural Products Cooperative
www.frontiercoop.com

Company Background

Frontier Natural Products, located in Norway, Iowa, offers a full line of natural and organic products in bulk or packaged form for retail consumption throughout North America. The cooperative boasts a membership pool of about 15,000. The pool includes numerous retailers who take advantage of Frontier's direct marketing and catalog systems to sell their own products. The company's goal is to provide consumers with the highest-quality organic and natural products while supporting and promoting social responsibility, sustainable agriculture and the environment.

Number of Employees: 150 - 200

Distribution Channels

The company distributes most products through a "Frontier Natural Brands" catalog and internet site at www.frontiernaturalbrands.com. The company also sells wholesale to qualified customers.

Sales

In fiscal year 2000, Frontier posted sales of about $40 million.

Products

Brand Names- Simply Organic- 100% certified-organic foods, Frontier Natural Brands- bulk and packaged organic culinary herbs, spices, seasoning blends, and baking flavors, Aura Cacia- natural personal care products enhanced with pure botanical essences.

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal, Echinacea angustifolia, Echinacea purpurea

Contacts

Headquarters: Frontier Natural Products Cooperative
3021 78th Street
PO Box 299
Norway, IA 52318

Phone: 800-669-3275

Frutarom Industries Ltd.
www.fruterom.com

Company Background

Frutarom Industries Ltd. (TASE: FUTR), headquartered in Haifa, Israel, manufactures products intended for the food and beverage, flavor, fragrance, nutraceutical, functional food, food additive, pharmaceutical, cosmetics and detergent industries. The company's products are manufactured at its own plants in Israel, the United States, the United Kingdom, China and Turkey. The Fine Ingredients Division develops, produces and markets raw materials, as well as plant extracts and other natural products, for manufacturing various flavors and fragrances. Frutarom Industries is a subsidiary of ICC Industries, a private U.S. company. It is, however, traded as a public company on the Tel Aviv Stock Exchange (TASE).

Number of Employees: 600

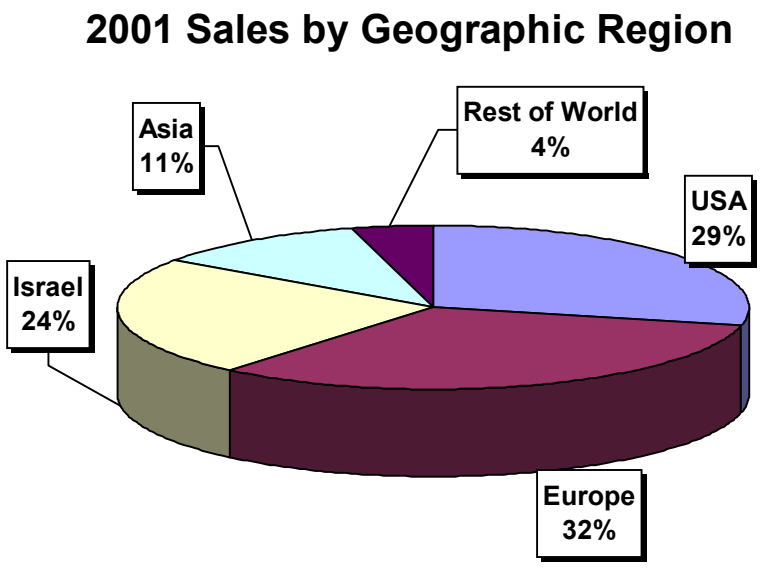
Recent News

June 2001

The company acquired the assets of the British company, CPL Aromas Ltd.'s flavors and fine ingredients divisions for about $16 million.

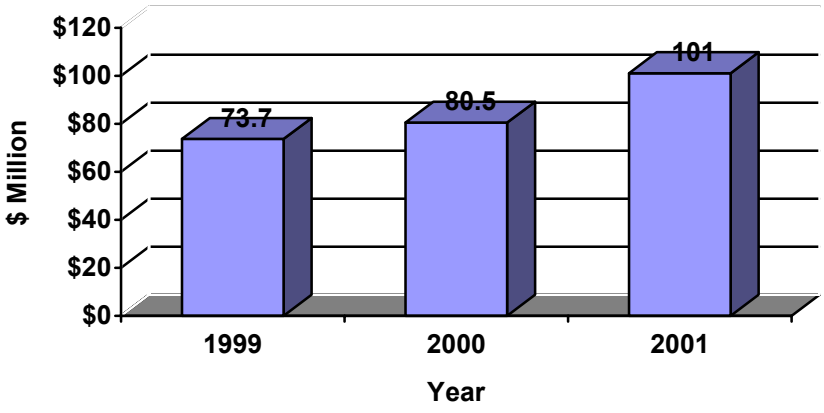
Distribution Channels

The company's products are marketed through multiple channels in Israel, the United States, the United Kingdom, France, China, Russia, the Ukraine, Kazakhstan, Turkey, Brazil, Singapore, Hong Kong and India. The United States accounted for 29% of the company's sales in 2001.



Sales

Net sales in 2001 were about $101 million, a 25.6% increase over 2000 results.



Products

Brand Names- Botanicare

Target Botanicals used in Herbal Products- American ginseng, Echinacea purpurea

Contacts

Corporate Headquarters:

Frutarom Industries Ltd.
PO Box 10067
Haifa, Israel

Phone: 972-846-2442

General Nutrition Companies Inc.
www.gnc.com

Company Background

General Nutrition Companies Inc. (GNC), headquartered in Pittsburgh, Pennsylvania, is the largest specialty retailer and vertically integrated manufacturer of vitamin, mineral, herbal and sports nutrition supplements in the United States. In 1999, GNC was acquired by Royal Numico NV and currently operates as a fully owned subsidiary of the company.

Number of Employees: 14,000

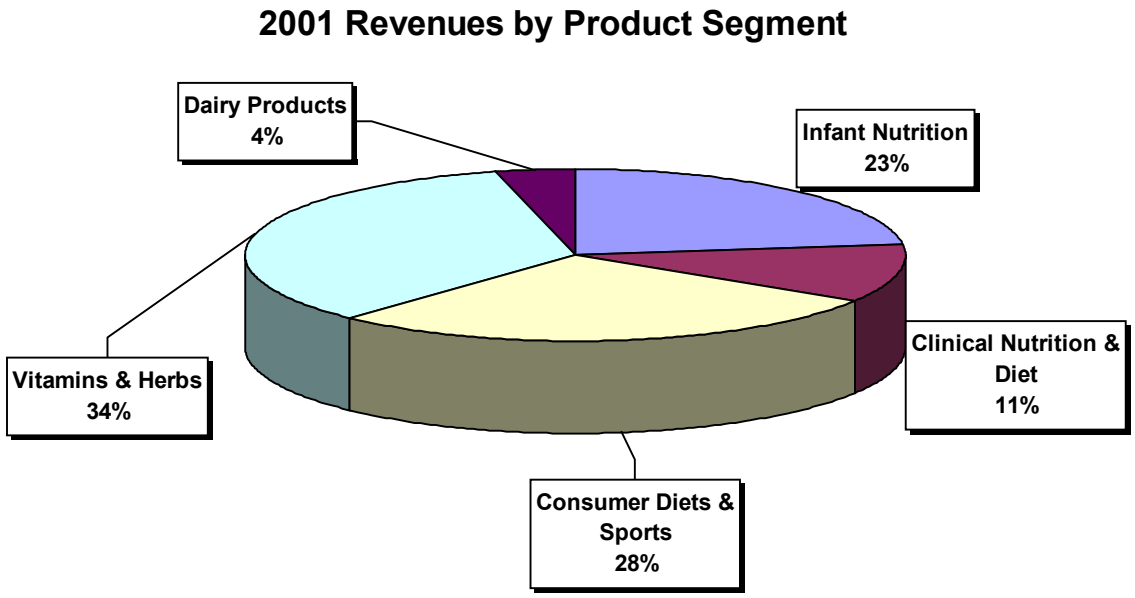
Recent News

November 2002

Royal Numico announced plans to restore GNC's performance in order for the subsidiary to remain a core component of the company. GNC will shift from a strategy of promotional pricing to one of market competitive pricing in an attempt to improve its product mix and profit margins.

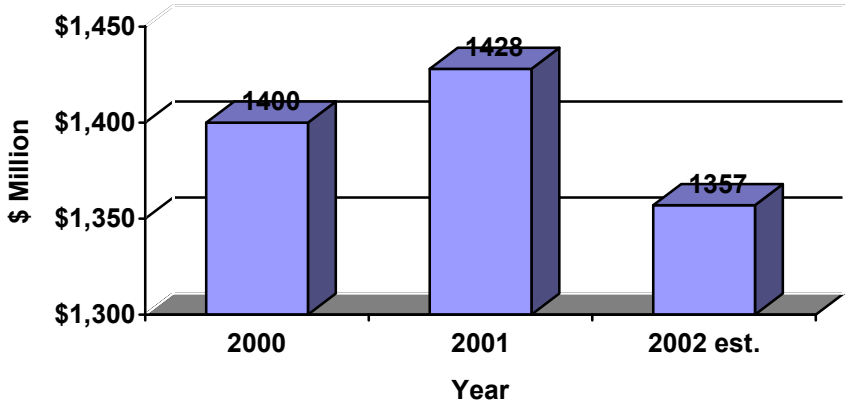
Distribution Channels

GNC operates more than 5,000 retail outlets throughout the United States and 26 foreign markets, including Canada and Mexico. The Vitamins and Herbs Segment of Royal Numico NV, comprised mainly of the subsidiaries GNC & Rexall Sundown, accounted for 34% of total revenues in 2001.



Sales

Net sales in 2001 were $1.428 billion. Net sales are expected to decrease about 5% for fiscal year 2002 as compared to 2001 results.



Products

Brand Names- GNC Herbal Plus, Fingerprinted Herbal Products, Full Spectrum Herbal Products.

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Echinacea angustifolia, Echinacea purpurea, Ginkgo biloba, Goldenseal, Skullcap, Wild yam

Contacts

Headquarters:	GNC, Inc. 300 Sixth Avenue Pittsburgh, PA 15222 Phone: 412-288-4600
Corporate Headquarters:	Royal Numico NV Rokkeveenseweg 49 2712 PJ Zoetermeer The Netherlands Phone: +31 79 353 9000

Hauser Inc.
www.hauser.com

Company Background

Hauser, (OTC BB: HAUS) headquartered in Long Beach, California, and Longmont, Colorado, is a leading supplier of natural product extracts and related products to the dietary supplement market in North America. The company also provides products and services to the pharmaceutical and food ingredient businesses. Hauser's business units include Botanicals International Extracts, Hauser Functional Food Ingredients Group, Hauser Contract Research Organization (CRO) and ZetaPharm.

Number of Employees: 195

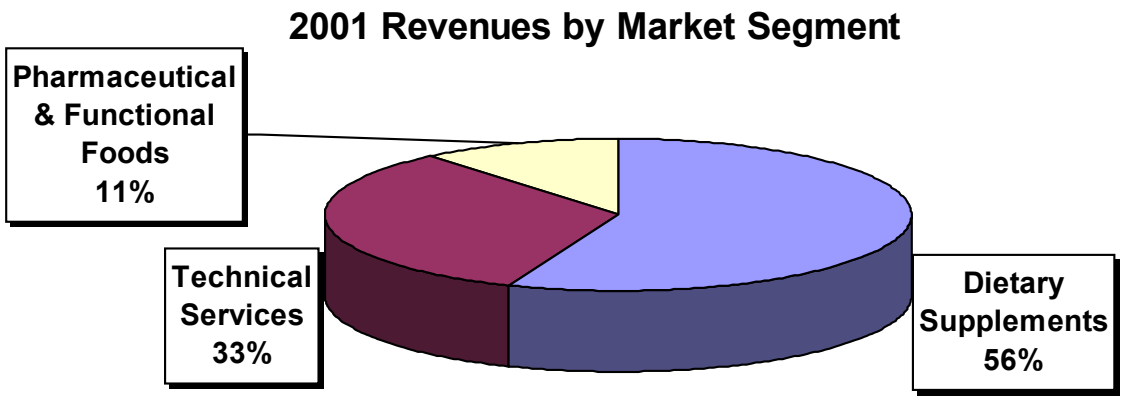
Recent News

August 2002

The company sold Shuster Laboratories to Specialized Technology Resources Inc. for about $7.8 million.

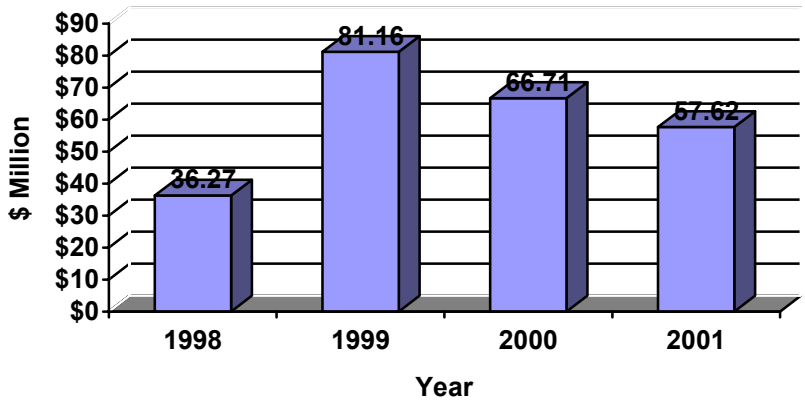
Distribution Channels

Hauser distributes extract products to a diverse group of finished goods manufacturers and extract distributors throughout the United States and Canada. The Botanical International Supplement Division, formerly part of ZetaPharm, provides vitamins, minerals and specialty supplements to the food, nutritional supplement and veterinary industries. Dietary supplements accounted for 56% of fiscal 2002 revenues.



Sales

Net sales in 2001 were almost $58 million, a 13.6% decrease from 2000 results.



Products

Brand Names- Identilok. This is the registered name of a testing procedure performed by Botanicals International (BI) that uses a combination of the latest tests to assure the quality of its natural extracts. The tests include Thin Layer Chromatography (TLC), Fourier Transform Infrared Radiation (FTIR), Microscopic Image Analysis, Organoleptic Testing and Macroscopic Taxonomy. High Performance Liquid Chromatography (HPLC) is performed if it is required to validate the sample.

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal, Echinacea angustifolia, Echinacea purpurea, Wild yam

Contacts

Corporate Headquarters: Hauser, Inc.
20710 Alameda St.
Long Beach, CA 90810
310-669-2164

Extract Operations: Dr. William Meer
Director of Extract Operations
Bmeer@botanicals.com

Herbal Products: Katie Ferren
Director of Herbal Products
Kferren@botanicals.com

Imperial Ginseng Products Ltd.

Company Background

Imperial Ginseng Products Ltd. (OTC BB: IGPFF.OB), headquartered in Vancouver, Canada, is engaged in the development of American ginseng products. Activities include the growing, brokering, processing, packaging, marketing and distribution of American ginseng products throughout North America, Southeast Asia and China. The company's principal products are American ginseng root and ginseng packaged products. In fiscal 2002, the company harvested about 140 acres of cultivated American ginseng that yielded about 380,000 pounds of root.

Number of Employees: 20 to 150 (depending on the season)

Recent News

December 2002

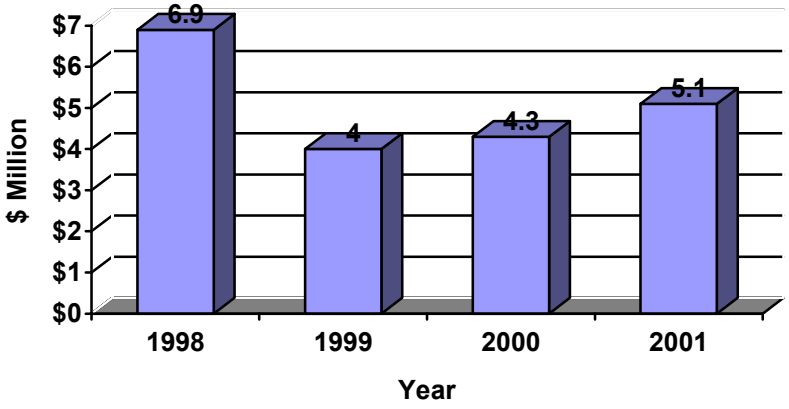
China's entry into the World Trade Organization will reduce tariffs on imported American ginseng into the country from 36% to 12%.

Distribution Channels

In 1999, all of the company's cultivated root material was sold to Asian interests represented by three or four buyers. Some of this material is processed in Asia and re-exported to North American markets.

Sales

Net sales in 2001 were approximately $5.1 million, an 18.6% increase over 2000 results.



Target Botanicals used in Herbal Products- American ginseng

Contacts

Corporate Headquarters: Imperial Ginseng Products Ltd.
Suite 1601-650 West Georgia
PO Box 11549
Vancouver, BC V6B 4N7
Canada
604-689-8863

Indena SpA
www.indena.com

Company Background

Indena is a privately held company headquartered in Milan, Italy. The company is the world leader in the identification, development and production of active principles derived from medicinal plants. Indena is a research-oriented company devoting a large amount of resources to the screening of medicinal plants for their pharmacological benefits. Other activities include the identification and exploitation of new active biological components and the development of extraction and purification systems used in manufacturing processes. In order to better control the quality of raw materials, the company maintains a plantation network to supply research and production needs. As of 2001, more than 60% of the raw materials used by the company in its manufacturing processes came from cultivated sources.

Number of Employees: 650 - 700

Recent News

January 2002

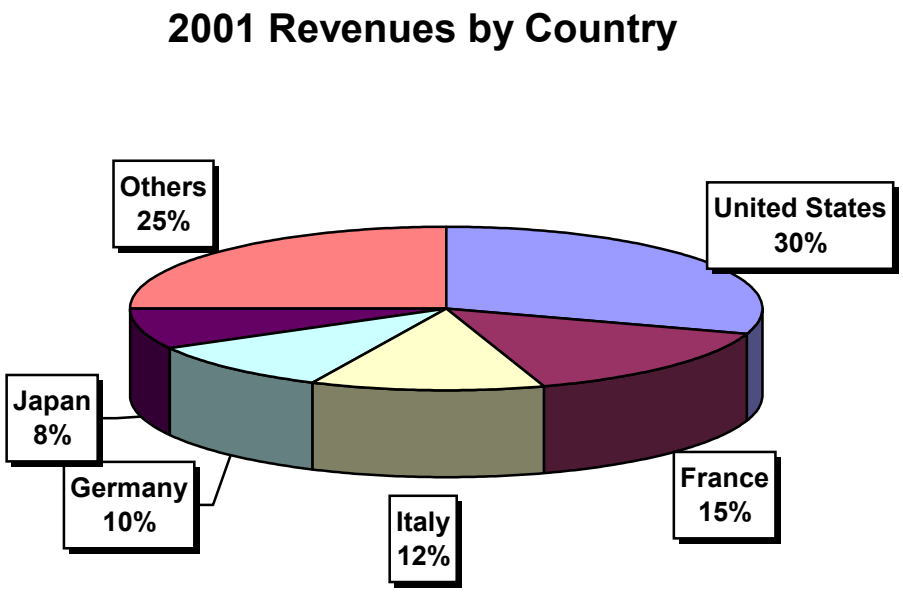
The company announced the development of Zanthalene 20% solution as a treatment for sensitive skin and released a new line of functional, concentrated and standardized fluid extracts called Cosmelenes. Each product is designed to provide a specific benefit when applied to the skin.

December 2002

The company launched the product "Polinacea", a new botanical extract, obtained from the roots of Echinacea angustifolia. The product is manufactured through the use of a new, patent-pending extraction process developed by Indena. Polinacea will be marketed as an immunological response modulator, increasing immune functions through direct action on T cells.

Distribution Channels

Indena distributes products to the health food, cosmetics and pharmaceutical industries. The pharmaceutical industry accounted for 65% of sales revenues in 2001. The United States accounted for 30% of the company's sales revenue in 2001 followed by France (15%), Italy (12%), Germany (10%) and Japan (8%).



Sales

Net sales in 2001 were approximately $170 million.

Products

Brand Names- Zanthalene, Curbilene, Cosmolenes, Greenselect, Ginselect, Polinacea, Soyselect.

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal, Echinacea angustifolia, Echinacea pallida, Echinacea purpurea

Contacts

Corporate Headquarters: Indena SpA
Viale Orties, 12
20139 Milan- Italy
+39 02 574961

U.S. Headquarters: Indena USA
1001 Fourth Avenue Plaza
Suite 3714
Seattle, WA 98154
206-340-6140

IVC Industries

www.ivcinc.com

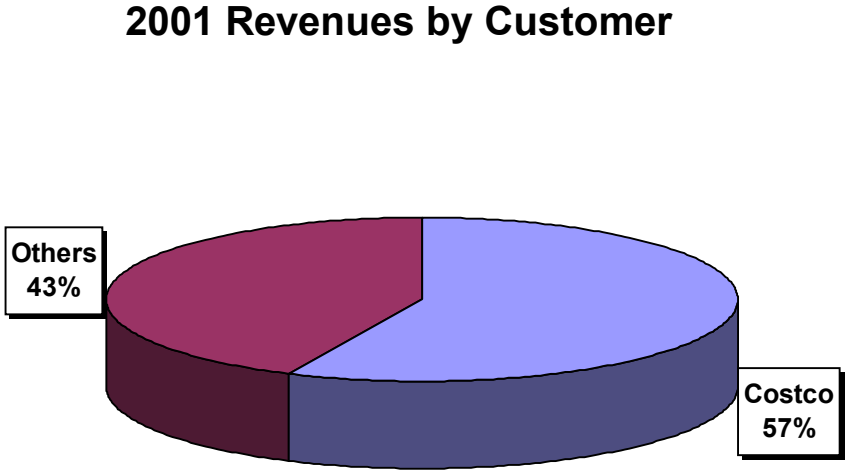
Company Background

IVC Industries (OTC BB: IVCO), headquartered in Freehold, New Jersey, manufactures, packages, sells and distributes vitamins, herbal remedies and mineral supplements. The company has operations in the United States, Middle East, Canada, Mexico, South Africa, Europe and the Pacific Rim. Its major competitiors in the nutritional supplement market are NBTY, Rexall Sundown, Leiner's Health Products and Pharmavite.

Number of Employees: 370

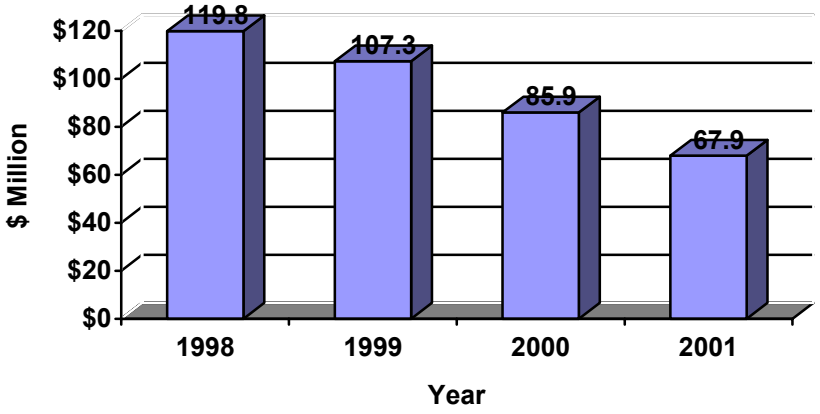
Distribution Channels

The company distributes its own brands and produces private label store brands for national and regional drug stores, club stores and supermarkets. The company's top ten customers accounted for 82% of sales revenues in 2001. Costco, a national club store chain, was the largest customer accounting for 57% of 2001 sales revenue for the company.



Sales

Sales revenues in 2001 were $67.9 million or about 21% lower than 2000 results.



Products

Brand Names- Nature, Liquafil, Rybutol, Nature's Wonder, Synergy Plus

Target Botanicals used in Herbal Products- American ginseng, Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

IVC Industries
500 Halls Mill Road
Freehold, NJ 07728

Phone: 732-308-3000

Leiner Health Products Inc.

www.leiner.com

Company Background

Leiner Health Products, headquartered in Carson California, is the largest private label manufacturer of vitamins, minerals and nutritional supplements. It is also the second largest manufacturer of private label OTC pharmaceuticals in the United States. Leiner manufactures over 400 different products for the pharmaceutical and food supplement industries, 100 of which are sold on the OTC market.

Number of Employees: 300 - 400

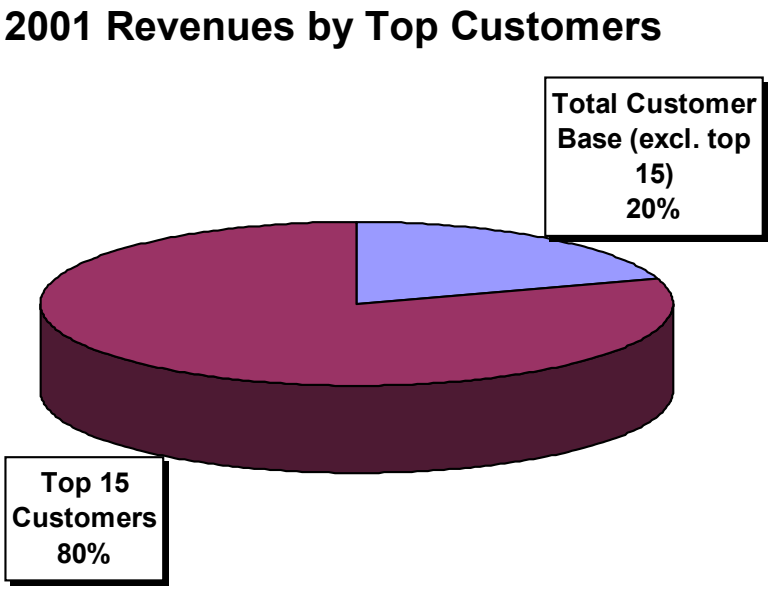
Recent News

November 2001

The company filed for Chapter 11 Bankruptcy protection to facilitate a reorganization of its core businesses.

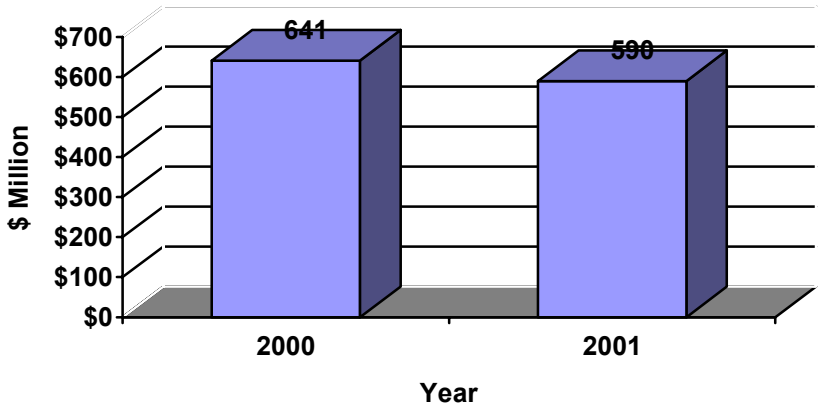
Distribution Channels

Leiner distributes products via private labels to national chains of drug stores, supermarkets and other mass market channels in the United States. The company also distributes products in Canada through its "Vita Health Products" subsidiary based in Winnipeg, Manitoba. Of the company's total customer base of 150, the top 15 produced 80% of sales revenues in 2001.



Sales

Sales revenues in 2001 were approximately $590 million, a decrease of about 8% from year 2000 results.



Products

Brand Names- Elite Naturals, Stanley Brand

Target Botanicals used in Herbal Products- Echinacea angustifolia, Echinacea purpurea

Contacts

Corporate Headquarters:

Leiner Health Products Inc.
901 E. 233rd Street
Carson City, CA 90745

Phone: 310-835-8400

Canada:

Vita Health
150 Beghin Avenue
Winnipeg, Manitoba
R2J3W2

Phone: 204-661-8386

Madaus AG
www.madaus.de

Company Background

Madaus AG, headquartered in Cologne, Germany, is a privately held company which is one of the leading drug manufacturers of herbal remedies in the world. The company concentrates on the development of innovative herbal remedies for selected ailments. Madaus' phytomedicines are recognized in the industry as benchmarks for natural products in the anti-inflammatory, liver function, autoimmune, digestion, circulatory and constipation treatment areas. In the 1930's, the company pioneered the use of Echinacea products for the stimulation of the body's immune system. Madaus operates subsidiaries in Spain, Luxembourg, Belgium, Portugal, Italy, France, Austria and North America.

Number of Employees: 1,200 – 1,500

Recent News

March 2001

The company sold its 50% interest in Nature's Way of Springville, Utah, for an undisclosed amount. Nature's Way is a manufacturer and distributor of nutritional and herbal supplements in the United States.

Distribution Channels

Madaus distributes products worldwide through subsidiaries and associate companies through marketing agreements in more than 50 countries. Euromed SA, a subsidiary based in Spain, distributes the majority of the group's retail herbal products in North America through Euromed USA. The main focus of the company's distribution network is Europe, the United States, Brazil and China.

Sales

Sales revenue for the company was about $222 million in 1998. Revenues are expected to be roughly the same in 2002.

Brand Names- EchinaGuard

Target Botanicals used in Herbal Products- Black cohosh, Echinacea angustifolia, Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

Madaus AG
Ostmerheimer Strasse 198
D-51109 Koln

Phone: +49 2 21/89 98 - 0

Euromed USA
1910 Cochran Road
Manor Oak One Suite 405
Pittsburgh, PA 15220

Phone: 412-344-3960

Martin Bauer Group GmbH
www.martin-bauer.com

Company Background

Martin Bauer Group, headquartered in Germany, is the parent company for a group of 30 firms operating around the world. The company embarked on a new business strategy in 2002, consolidating its collection of companies under the concept of "The Nature Network". The Nature Network supplies a variety of products and services related to plant-based materials to the food, cosmetic and pharmaceutical industries. The concept of The Nature Network is primarily represented by the five business segments or "brands":

- Martin Bauer- herbal and fruit teas, black and green teas, and botanicals
- Plantextrakt- decaffinated teas, and herbal and tea extracts for the food and beverage industry
- Finzelberg- extracts for phytophamaceuticals and dietary supplements
- PhytoLab- development, analysis and regulatory support for plant-based products
- Europlant- sales of phytopharmaceuticals

Number of Employees: 1,900- 2,400

Recent News

January 2002

Finzelberg announced an agreement with Penwest Pharmaceuticals Co. to jointly develop and market a new line herbal supplements utilizing Penwest's PROSOLV technology. The new line of supplements will be marketed to nutritional companies under the brand name RediRun DC.

Distribution Channels

The company distributes herbal products primarily through its Finzelberg and Plantextrakt subsidiaries to manufacturers in numerous industries that incorporate plant extract material into finished products.

Sales

Sales revenue in 2001 was more than $450 million.

Products

Brand Names - The Nature Network

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Echinacea angustifolia, Echinacea pallida, Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

MB-Holding GmbH & Co.
Dutendorfer Strasse 5-7
91487 Vestenbergsgreuth
Germany

Phone: +49 9163 88-0

Natrol Inc.
www.natrol.com

Company Background

Natrol (Nasdaq: NTOL) manufactures and markets more than 185 products, including dietary supplements, herbal teas, nutraceutical ingredients and sports nutrition products for distribution throughout the United States. Dietary supplements are sold primarily under the Natrol brand. These supplements include vitamins, minerals, hormonal supplements and herbal products. The company operates various segments of its overall business within branded groups. Some of these groups include Laci Le Beau, flavored herbal teas; Prolab Nutrition, sports nutrition products; and Essentially Pure Ingredients, nutraceutical grade ingredients such as garlic, vegetable powders and kava.

Number of Employees: 255

Recent News

November 2002

The firm announced the formation of a new division named Tamsol, Inc. This wholly owned subsidiary of Natrol will focus on building a base of direct-response clients and traditional advertisers.

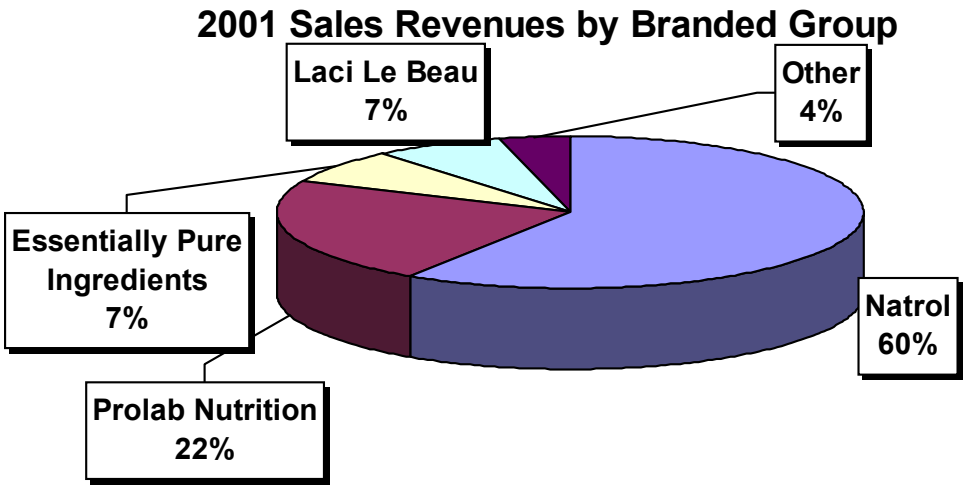
September 2002

The company announced that its branded menopause treatment "Natrol Complete Balance AM/PM Formula" has experienced a 63% increase in sales. This growth compares favorably to a 21% increase in overall sales for the menopause category of dietary supplements. This product contains Black cohosh and soy isoflavones.

Distribution Channels

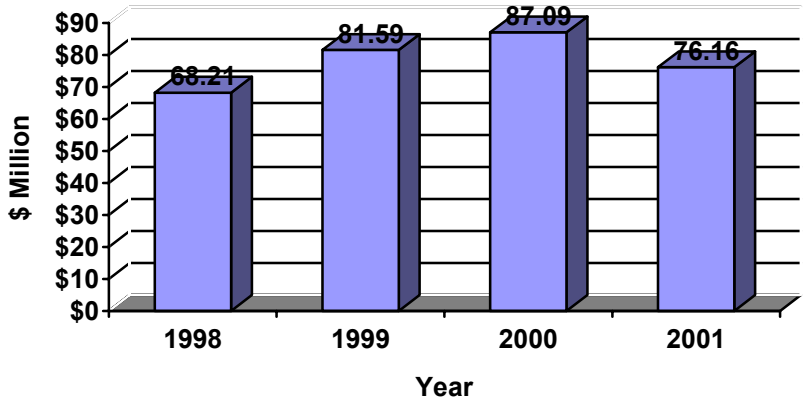
The company sells products through multiple distribution channels. These channels include direct offerings to domestic health food stores and mass market drug, retail and grocery stores. The company also sells products through independent catalogs, internet shopping sites and, on a limited basis,

to foreign countries through international distributors. Sales revenue in 2001 by branded group as a percentage of total sales revenue is listed below.



Sales

Net sales in 2001 were about $76 million.



Products

Brand Names- Laci Le Beau, Prolab, Natrol: MSM- line of joint-care products, Natrol Complete Balance AM/PM Formula

Target Botanicals used in Herbal Products- Black cohosh, Ginkgo biloba, Goldenseal, Echinacea purpurea, Skullcap, Wild yam

Contacts

Corporate Headquarters: Natrol, Inc.
21411 Prairie St.
Chatsworth, CA 91311
818-739-6000

Director of International Sales:
Peter Gil
Pgil@natrol.com

Director of Quality Control:
Stephen Collins
Scollins@natrol.com

Vice President of Marketing and Product Development:
Peter Leighton
Pleighton@natrol.com

Nature's Bounty Inc.
www.nbty.com

Company Background

Nature's Bounty, (Nasdaq: NBTY) headquartered in Bohemia, New York, was founded in 1971 and is a leading vertically integrated manufacturer and distributor of nutritional supplements. The company manufactures more than 1,000 products, including vitamins, minerals, herbs, amino acids, sports nutritional products, diet aids and other nutritional supplements. In the United States, major competitors in the retail market are General Nutrition Center (GNC) and Nature's Sunshine Products. Since 1986, the company has acquired approximately 27 businesses that were engaged in the direct response, retail and manufacture of nutritional supplements.

Number of Employees: 7,900

Recent News

August 2002
Nature's Bounty announced the acquisition of a line of nutritional supplements sold under the "Synergy Plus" trademark.

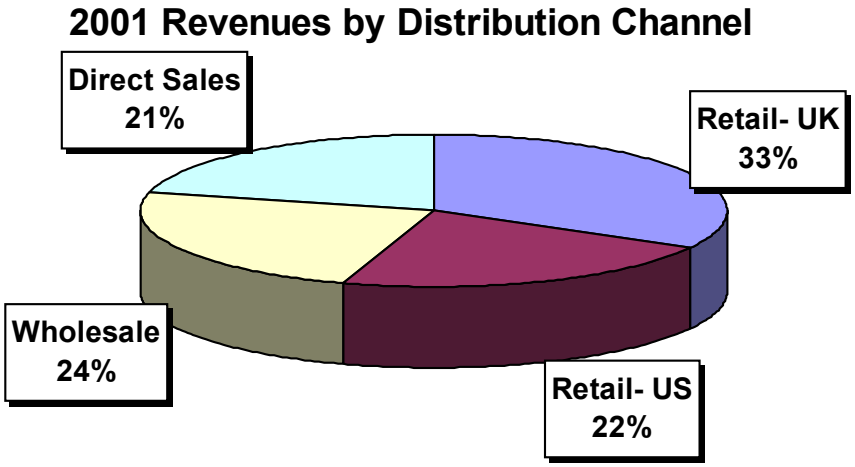
December 2001
The company acquired the "Knox NutraJoint" and "Knox for Nails" nutritional supplement businesses from Kraft for about $4 million.

May 2001
The firm completed the acquisition of Global Health Sciences Inc., a manufacturer of nutritional supplements in California, for about $40 million.

May 2001
A contract was announced to purchase NatureSmart from Whole Foods Market, Inc. for $28 million in cash.

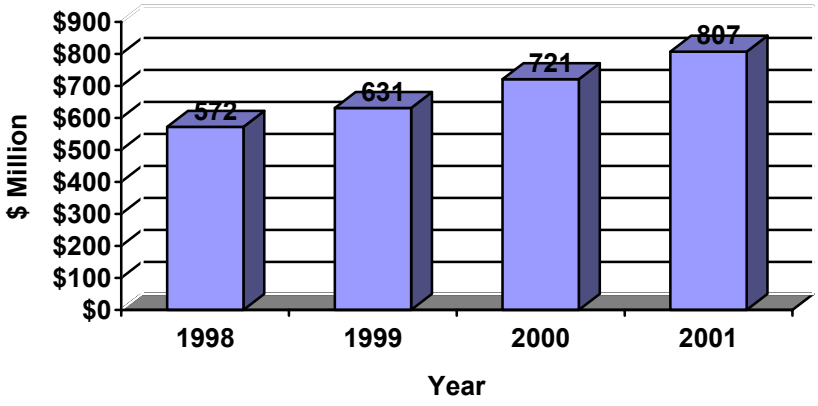
Distribution Channels

Nature's Bounty distributes products through 530 Vitamin World and Nutrition Warehouse stores in the United States and Puerto Rico and 465 Holland & Barrett stores in the United Kingdom and Ireland. It operates several wholesale divisions that target specific groups such as wholesalers, distributors, pharmacies and bulk and international customers. Puritan.com is the company's Web site for online/direct sales to the public. Retail sales in the United Kingdom and Ireland were the company's greatest contributor to 2001 revenues, accounting for 33% of the total.



Sales

Net sales in 2001 were almost $807 million, a 12% increase over 2000 results.



Products

Brand Names- Nature's Bounty, Vitamin World, Puritan's Pride, Holland & Barrett, Nutrition Headquarters, American Health, Nutrition Warehouse, Dynamic Essentials, Good 'N Natural

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal, Echinacea purpurea, Wild yam

Contacts

Corporate Headquarters: NBTY, Inc.
90 Orville Drive
Bohemia, New York 11716
631-567-9500

NBTY Manufacturing: Dan Parkhideh
Senior Vice President, Manufacturing Worldwide

Michael Oliveri
Vice President of Purchasing and Planning
In North America

Wholesale Divisions: Albert Anastasi
President

Nature's Sunshine Products
www.naturessunshine.com

Company Background

Nature's Sunshine Products (Nasdaq: NATR), headquartered in Provo, Utah, manufactures and markets a broad range of herbal products, vitamin and mineral supplements, personal care and homeopathic remedies. The company's herbal products include shampoos, skin treatments, extracts and powders. Its homeopathic products are designed for the treatment of allergies and other common illnesses.

Number of Employees: 1,109

Recent News

June 2002

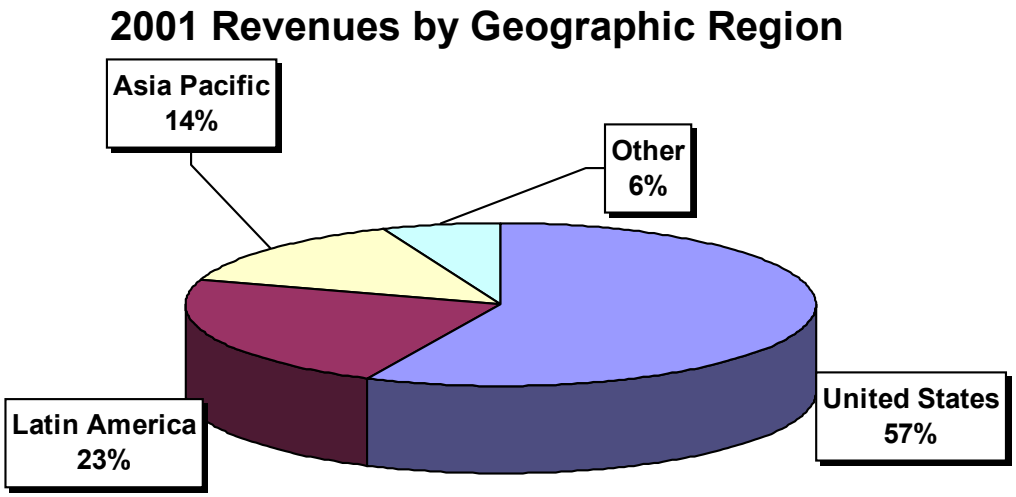
The company announced the closure of its Boulder office in order to concentrate on core businesses.

December 2001

The firm announced a strategic alliance with HealthTech Inc., a manufacturer and marketer of personal health monitoring devices, to provide personal health monitoring measurements and tools to consumers through the independent sales force of Nature's Sunshine Products.

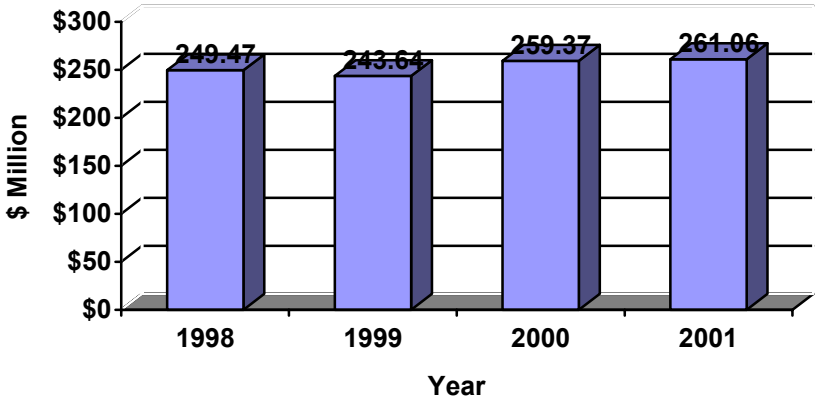
Distribution Channels

The company distributes products through a direct marketing system of Distributors and Managers. A Distributor attains the title of Manager after the completion of sales and networking goals established by the company. As of June 2002, 555,000 persons were listed as Distributors, and 19,100 persons were listed as Managers. The company sells and markets products in more than 30 countries across the world. Revenues are reported geographically by segment. In 2001, 57% of sales revenue emanated from the United States.



Sales

Net sales in 2001 were approximately $261 million. This amount represents just a 0.7% increase over 2000 results.



Brand Names- Nature's Sunshine

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal, Echinacea purpurea, Skullcap, Wild yam

Contacts

Corporate Headquarters: Nature's Sunshine Products
75 East 1700 South
Provo, Utah 84606

Phone: 801-342-4300

Naturex SA
www.naturex.com

Company Background

Naturex SA, headquartered in France, is a specialized producer of natural ingredients for the agroalimentary (flavors, dyes, and antioxidants), aromatic (pure vegetable extracts) and nutraceuticals industries. Plant and vegetable extracts accounted for 67% of sales revenues in 2001. Finished goods production accounted for the remainder of sales revenues.

Number of Employees: 123

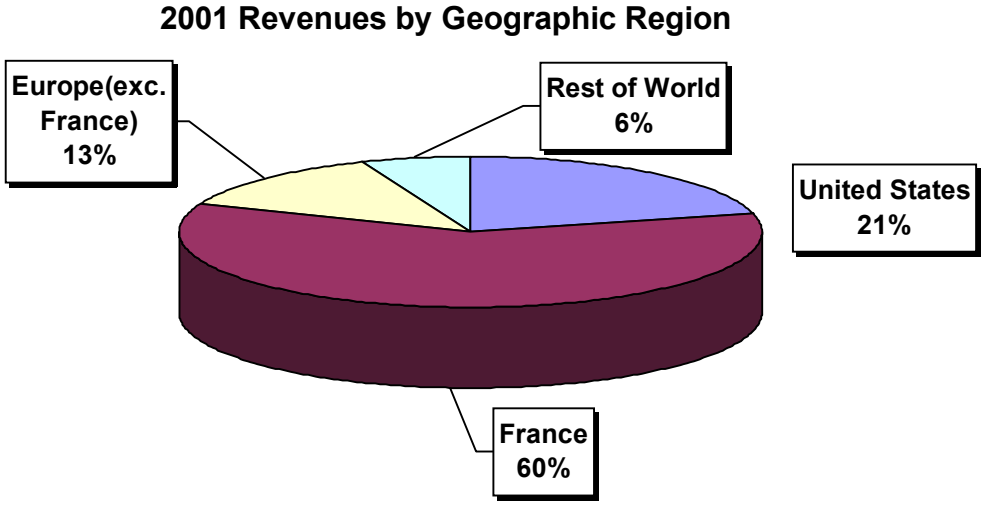
Recent News

June 2002

The company acquired Brucia Plant Extracts of Shingle Springs, California, for an undisclosed amount. The acquisition of Brucia increases the company's offerings in the nutraceuticals segment of business from 15 to over 200 extract offerings.

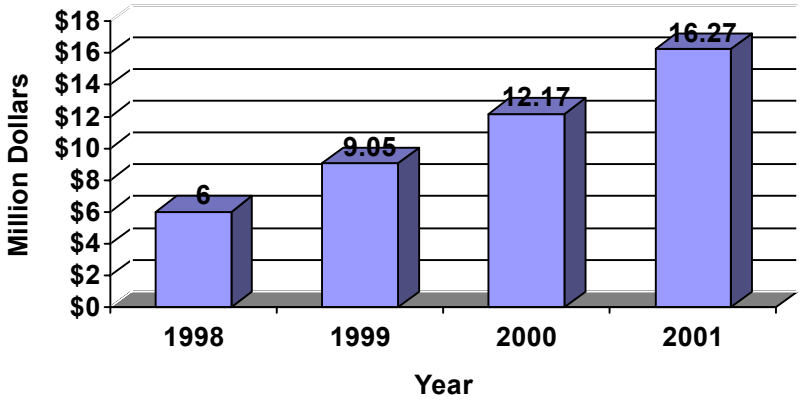
Distribution Channels

The nutraceuticals segment of the company accounted for 50% of sales revenues in 2001. For the entire company, France accounted for about 60% of 2001 sales revenues.



Sales

Sales revenues in 2001 exceeded $16 million.



Brand Names- Theraplant Standardized Extracts (Brucia)

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Echinacea angustifolia, Echinacea purpurea, False unicorn, Goldenseal, Ginkgo biloba, Goldenseal, Skullcap, Wild yam

Contacts

Corporate Headquarters:

Naturex SA
Agroparc Zac Montfavet Pole
84140 Avignon
France

Phone: 049 023 96 89

NOW Foods Inc.
www.nowfoods.com

Company Background

NOW Foods, located in Bloomington, Illinois, manufactures and distributes high-quality nutritional products and herbal supplements. The company maintains a broad line of products, including vitamins, minerals, sports supplements, herbs, herbal teas, functional foods and cosmetics. NOW Foods averages over 50 new product introductions a year and currently has over 200 SKU's in its inventory.

Number of Employees: 300 - 350

Recent News

September 2002

The company acquired Nature's Apothecary of Louisville Colorado for an undisclosed amount. The company's manufacturing and distribution operations have been consolidated into NOW's Illinois facilities.

Distribution Channels

NOW Foods distributes products to health food stores across the United States. It also makes products available to consumers via numerous online retail outlets.

Sales

Sales revenues in 2001 were between $40 million and $70 million.

Products

Brand Names- Nature's Apothecary, NOW Foods

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Bloodroot, Echinacea angustifolia, Echinacea purpurea, Ginkgo biloba, Goldenseal, Wild yam

Contacts

Corporate Headquarters:

NOW Foods Inc.
395 Glen Ellyn Road
Bloomingdale, IL 60108

Phone: 888-NOW-FOOD

Nuova Linnea SA
www.linnea-worldwide.com

Company Background

Nuova Linnea SA, headquartered in Locarno, Switzerland, is a manufacturer of fine botanicals that specializes in the extraction, purification and processing of plant material containing pharmacological properties. The company, operated as a joint venture of Dr. Willmar Schwabe Group of Germany and Beaufor Ipsen of France, is vertically integrated with complete supply-chain traceability. Linnea sources raw materials exclusively through a network of specialized buyers and grows much of its own raw materials on plantations located around the world.

Number of Employees: 70 - 100

Distribution Channels

Linnea is a supplier to the largest manufacturers in the natural health industry. Linnea's U.S. office provides North American companies with easy access to products manufactured in Switzerland.

Sales

Net sales in 1999 were approximately $20 million.

Products

Brand Names- LINNEAssure

Target Botanicals used in Herbal Products- Ginkgo biloba, Echinacea angustifolia

Contacts

Corporate Headquarters:

Nuova Linnea SA
Via Cantonale
6595 Riazzino
Switzerland

Phone: +41 91 850 5050

United States Offices:

Linnea
435 McCarney Street
Easton, PA 18042

Phone: 610-253-0044

Nutraceutical International Corp.
www.nutraceutical.com

Company Background

Nutraceutical International Corp (Nasdaq: NUTR) is one of the nation's leading manufacturers and marketers of branded nutritional supplements sold to health and natural food stores. It manufactures and distributes one of the broadest-branded product lines in the industry with over 2,500 stock keeping units (SKU's). 400 of the units are sold exclusively in overseas markets. In addition, the company manufactures bulk extracts and powders for its own use as well as for sale to other manufacturers and marketers in the nutritional supplement industry. The company's main competitors in the healthy foods channel are Twinlab, Solgar, Nature's Plus, Country Life, Nature's Way and NOW Foods.

Number of Employees: 570

Recent News

October 2002

Forbes Magazine named the company as one of "The 200 Best Small Companies in America in 2002". Nutraceutical International was ranked 102nd on the list.

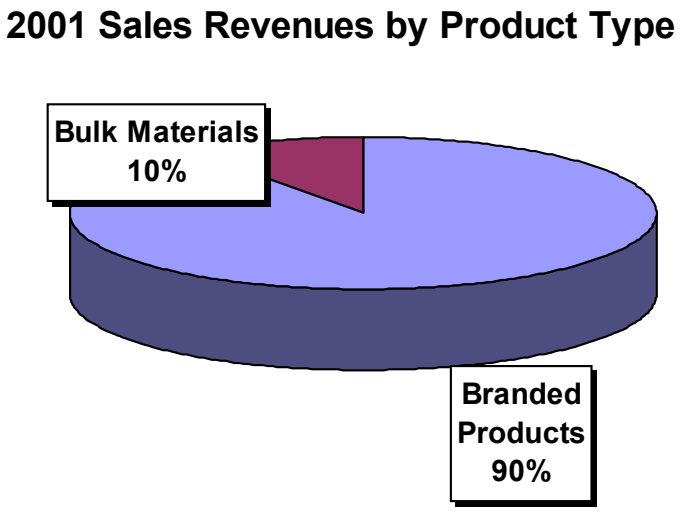
March 2002

Fresh Organics Inc, a wholly owned subsidiary of Nutraceutical International, acquired three natural food markets in San Francisco from the Real Food Company for approximately $2.7 million in cash.

Distribution Channels

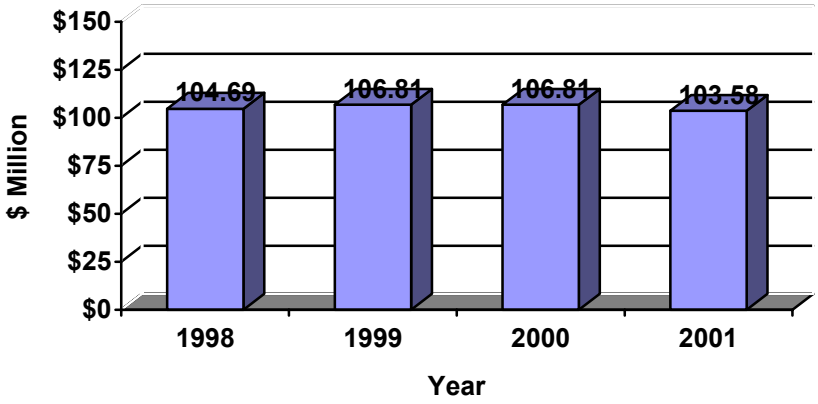
The company ships most products directly to retailers via Federal Express and UPS. Shipments are made from the company's distribution centers located in Ogden, Utah, and Memphis, Tennessee. All domestic distribution is organized under the subsidiary company, Nutraforce Inc. The company also operates a smaller distribution center in British Columbia for Canadian

sales. It contracts sales to the United Kingdom through an independent fulfillment center. The company's various branded products accounted for 90% of sales revenues in 2001.



Sales

Net sales in 2001 were about $104 million, a 3% decrease over 2000 results.



Products

Brand Names- Solaray, Sunny Green, Kal, NaturalMax, VegLife, Natural Sport, ActiPet, Action Labs, Thompson, Ultimate Nutrition.

Bulk Material - Monarch Nutritional Laboratories, Great Basin Botanicals

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal, Echinacea angustifolia, Echinacea purpurea, Skullcap, Wild yam

Contacts

Corporate Headquarters: Nutraceutical International Corp.
1400 Kearns Boulevard
2nd Floor
Park City, Utah 84060
800-669-8877

P. Broste A/S
www.broste.com

Company Background

P. Broste A/S, headquartered in Lyngby Denmark, is an international distribution and manufacturing company consisting of four industry-based business units: Chemicals, Salt, Food & Health Care, and Consumer Products. The company's core competence is the sourcing of raw materials, intermediates and additives for a variety of industries.

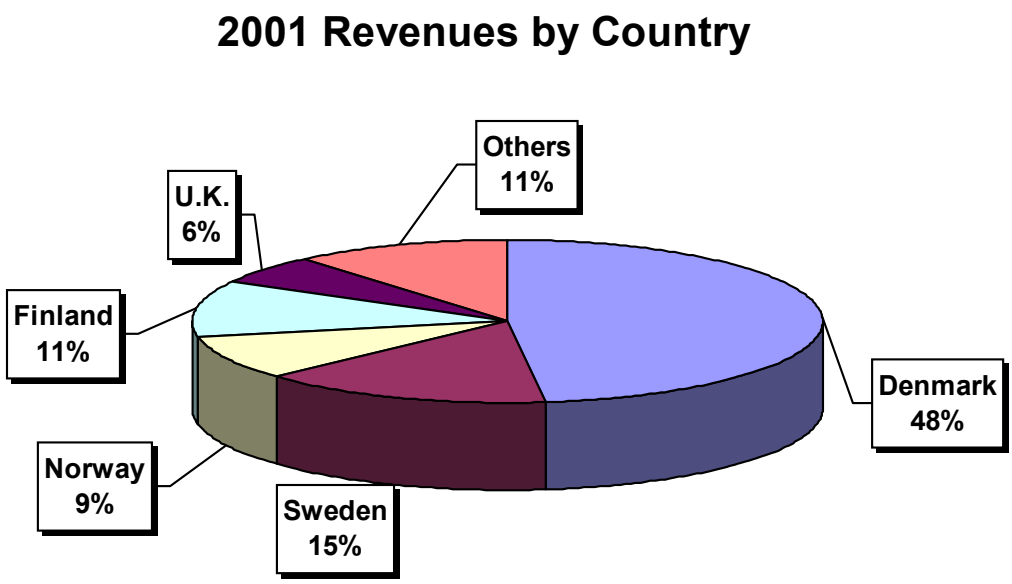
Number of Employees: 450

Recent News

January 2002
The company concluded an agreement with Cognis Oleochemicals, which expands Broste's agency and distribution agreement with Cognis to include Sweden, Norway and Finland.

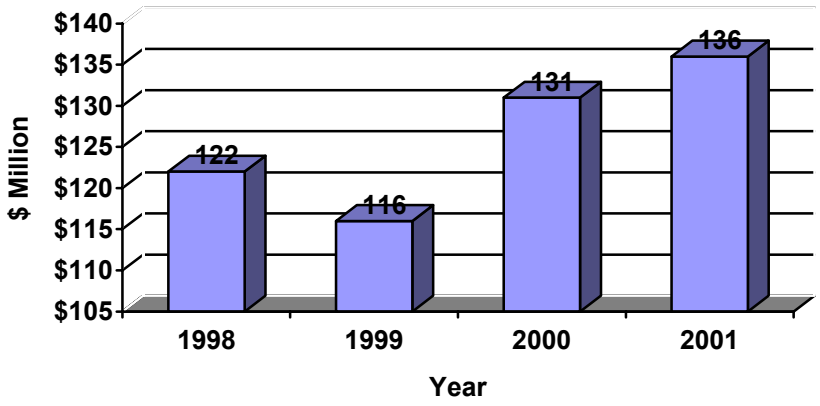
Distribution Channels

The company maintains subsidiaries and distribution centers in Norway, Sweden, Finland, Iceland, the Baltic States, the United Kingdom, Poland and China. In 2001, Denmark accounted for 48% of the company's sales revenues.



Sales

Sales revenues in fiscal year 2001 were about $136 million. This amount was 3.7% higher than fiscal 2000 results.



Products

Target Botanicals used in Herbal Products- Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

P. Broste A/S
Lundtoftegaardsvej 95
DK-2800 Kgs. Lyngby
Denmark

Phone: +45 4526 3333

Pacific Botanicals
www.pacificbotanicals.com

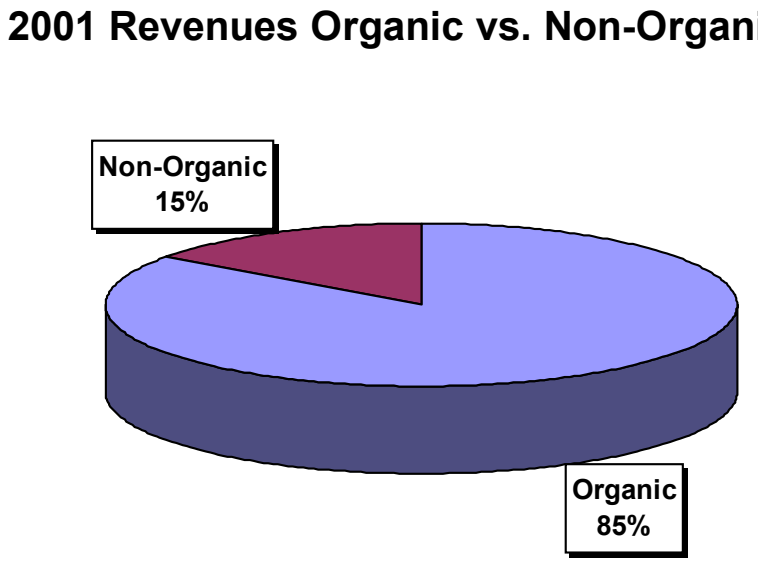
Company Background

Pacific Botanicals, located in Grants Pass, Oregon, is the most experienced and diversified medicinal herb farm in North America. The company sells or produces over 175 medicinal herbs and spices in whole, cut or powder forms. The company owns a 114-acre organic farm and contracts with 8 other certified organic farms to produce some of its herbal products. The remainder of inventory and products emanate from wild harvested sources.

Number of Employees: 30

Distribution Channels

The company distributes its products through a company-owned web site and through a network of health stores located throughout the Pacific Northwest. In 2001, 85% of sales revenues resulted from the sale of organically certified materials.



Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Bloodroot, Ginkgo biloba, Goldenseal, Echinacea angustifolia, Echinacea pallida, Echinacea purpurea, Skullcap, Wild yam

Contacts

Corporate Headquarters: Pacific Botanicals
4350 Fish Hatchery Road
Grants Pass, Oregon 97527
541-479-7777

Pharmavite LLC
www.vitamin.com

Company Background

Pharmavite, headquartered in Northridge, California, is a leading manufacturer and marketer of vitamins and herbal supplements in the United States. The company is a fully owned subsidiary of Otsuka Pharmaceuticals of Japan.

Number of Employees: 832

Distribution Channels

The company distributes products through national supermarkets, drug stores and other mass merchandiser channels.

Sales

Sales revenue in 2001 was approximately $80 million to $120 million.

Products

Brand Names- Nature Made Vitamins, Nature's Resource Premium Herbs

Target Botanicals used in Herbal Products- Black cohosh, Echinacea angustifolia, Echinacea purpurea, Ginkgo biloba, Goldenseal

Contacts

Corporate Headquarters:

Pharmavite LLC
8510 Balboa Avenue
Northridge, CA 91325

Phone: 818-221-6200

Phytobiotics Futterzusatzstoffe GmbH
www.phytobiotics.com

Company Background

Phytobiotics Futterzusatzstoffe GmbH, located in Germany, was founded in January 2000. The company supports the animal feed industry by providing feed additives manufactured from natural sources.

Number of Employees: 250

Distribution Channels

The company distributes products through contracted business partners in Austria, Spain, Norway, the Netherlands, Switzerland and France.

Products

Brand Names- Sangrovit, Immunmilch, SorbiAcid, Fructomix/ Pre-Biofeed, Aroma-Suess-stoffe

Target Botanicals used in Herbal Products- Bloodroot

Contacts

Corporate Headquarters:

Phytobiotics Futterzusatzstoffe GmbH
Mark.str1
D-65343 Eltville
Germany

Phone: +49 6123\ 630 911

Pure World, Inc.
www.pureworld.com

Company Background

Pure World (Nasdaq SC: PURW), headquartered in Bedminster, NJ, develops, manufactures and sells natural ingredients principally derived from medicinal herbs using the company's proprietary extraction technologies. It has produced more than 1,000 botanical extracts for use by the cosmetic, food and flavor, nutraceutical and pharmaceutical industries. Through its wholly owned subsidiary, Pure World Botanicals Inc., the company offers more than 50 standardized extract products. The firm also produces high-capacity spray dryers used in free-flowing powders for tableting, encapsulation or dissolution in liquids. Pure World maintains a 35% ownership stake in "Gaia Herbs", a privately held maker of fluid botanical extracts for the high-end consumer market.

Number of Employees: 86

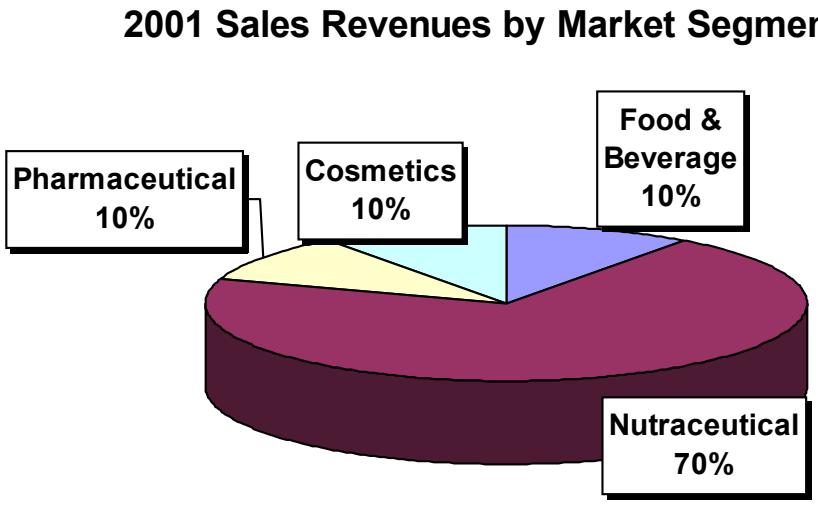
Recent News

January 2002

The company introduced four "LeanLine" botanical extract products. "Pure Powders", a new process for sanitizing herbal powders without the use of irradiation or Ethylene Oxide, was offered by the company.

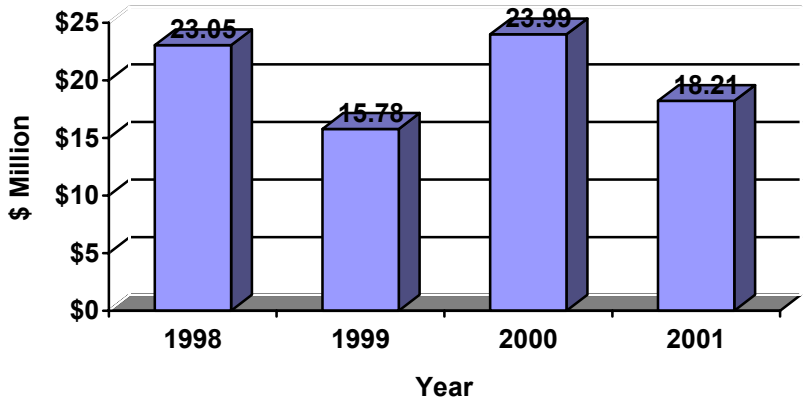
Distribution Channels

The company sells directly to the food and beverage, nutraceutical, pharmaceutical and cosmetic industries. Revenues from the food and beverage, nutraceutical and pharmaceutical industries are mostly generated domestically, while revenues from the cosmetic industry are generated mostly from overseas sales.



Sales

Net sales in 2001 were about $18.2 million. This amount represents a 24% decrease from year 2000 results.



Products

Brand Names- LeanLine Botanical Extracts

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Ginkgo biloba, Goldenseal

Contacts

Corporate Headquarters: PureWorld Botanicals
375 Huyler Street
South Hackensack, NJ 07606
201-440-5000

Rexall Sundown Inc.
www.rexallsundown.com

Company Background

Rexall Sundown, headquarterd in Boca Raton, Florida, develops, manufactures and sells vitamins, nutritional supplements and consumer health products. The majority of the company's products are in tablet, softgel or two-piece capsule forms. The acquisition of MET-Rx and Worldwide Sports Nutrition extended the company's deliverable products to include powders, liquids and bar forms. In 2000, the company was acquired by Royal Numico Group of the Netherlands and currently operates as a fully owned subsidiary. Royal Numico announced plans to fully divest itself of the Rexall Sundown subsidiary sometime in fiscal year 2003.

Number of Employees: 1,300

Recent News

November 2002

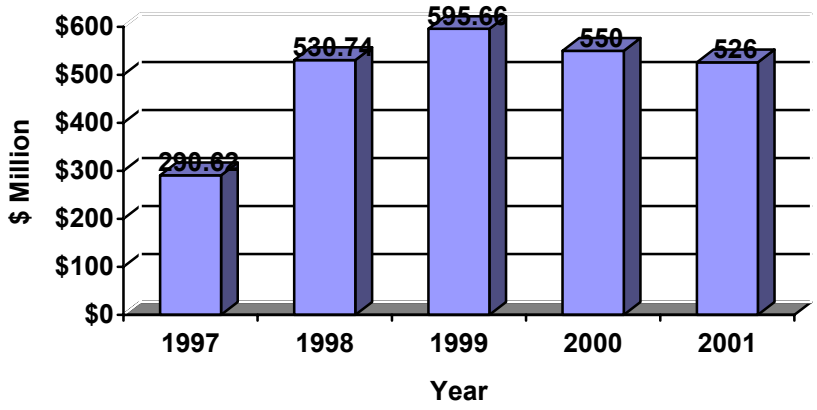
Royal Numico announced plans to fully divest itself of the Rexall Sundown subsidiary sometime in fiscal year 2003.

Distribution Channels

Rexall Sundown distributes products through two channels of distribution: sales to retailers and direct sales through independent distributors. Sundown and Rexall products are sold by mass mechandisers, drugstores and supermarkets.

Sales

Before the company's merger into the Royal Numico Group, net sales in 1999 were approximately $596 million. Net sales in 2001 were about $526 million.



Brand Names- Sundown, Rexall, MET-Rx, Metab-O-LITE, Thompson

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Echinacea angustifolia, Echinacea purpurea, Ginkgo biloba, Goldenseal, Skullcap, Wild yam

Contacts

Corporate Headquarters: Rexall Sundown Inc.
6111 Broken Sound Parkway, NW
Boca Raton, FL 22487

Phone: 561-241-9400

Sabinsa Corporation
www.sabinsa.com

Company Background

Sabinsa Corporation, headquartered in Piscataway, New Jersey, was founded in 1988 and is a manufacturer and supplier of high-quality fine chemicals and organic intermediates. Many of the company's products are used in the pharmaceutical and nutrition industries. The company's research facilities, located in the United States and India, are focused on process development and product innovation. Commercial-scale production is handled at the company's five manufacturing facilities located in Southern India. Product volumes range from a few hundred kilograms to several hundred tons. All of the products intended for human consumption are certified Kosher. The company currently produces over 140 dietary supplement ingredients.

Number of Employees: 400

Sales

Sales revenue in 2001 was approximately $20 million - $30 million.

Products

Target Botanicals used in Herbal Products- Wild yam

Contacts

Corporate Headquarters: Sabinsa Corporation
121 Ethel Road West Unit #6
Piscataway, NJ 08854

Phone: 732-777-1111

Schaper & Bruemmer
www.schaper-bruemmer.de

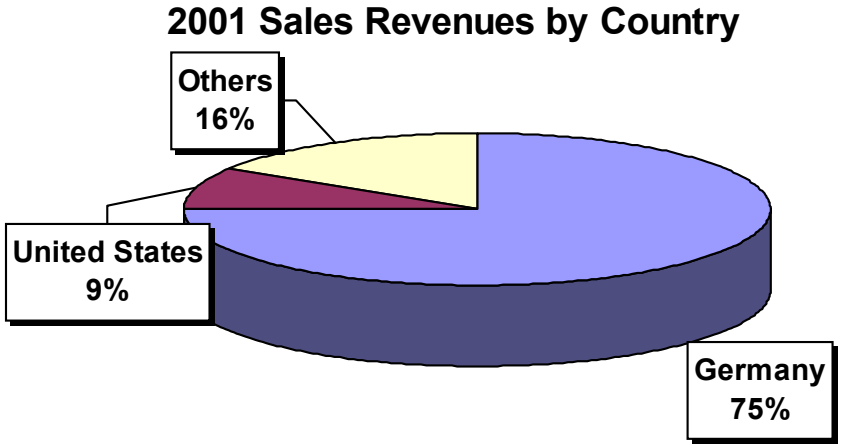
Company Background

Schaper & Bruemmer, headquartered in Salzgitter, Germany, is a third-generation family-owned company specializing in the manufacture and distribution of medicines and supplements made from natural substances. The company is the world leader in the manufacture of herbal products for gynecological disorders and spends almost 10% of annual sales revenue on research and development.

Number of Employees: 310

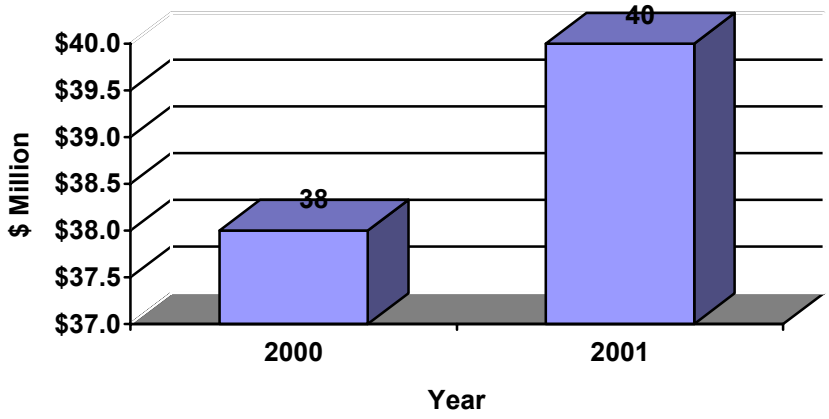
Distribution Channels

Schaper & Bruemmer distributes products through licensing agreements with pharmaceutical companies around the world. It currently exports products to the United States, China, Japan, Canada and Central and South America. The company's two best selling products, Remifemin and Esberitox, are licensed for distribution in the United States by Glaxo-SmithKline and Enzymatic Therapy, respectively. Germany accounted for 75% of total sales revenues for the company in 2001.



Sales

Net sales in 2001 were about $40 million. This amount represents a 5.3% increase over 2000 results.



Products

Brand Names- Remifemin, Esberitox, Sedacur, Esbericum, Femicur

Target Botanicals used in Herbal Products- Black cohosh, Echinacea pallida, Echinacea purpurea, Wild indigo

Contacts

Corporate Headquarters:

Schaper & Bruemmer GmbH
Bahnhofstrasse 35
38259 Salzgitter
Germany

Phone: +49 53 41 30 70

Schweizerhall Holding Inc.
www.schweizerhall.com

Company Background

Schweizerhall Holding, headquartered in Basel, Switzerland, is a holding company with interests in the chemical industry. It operates through two divisions:

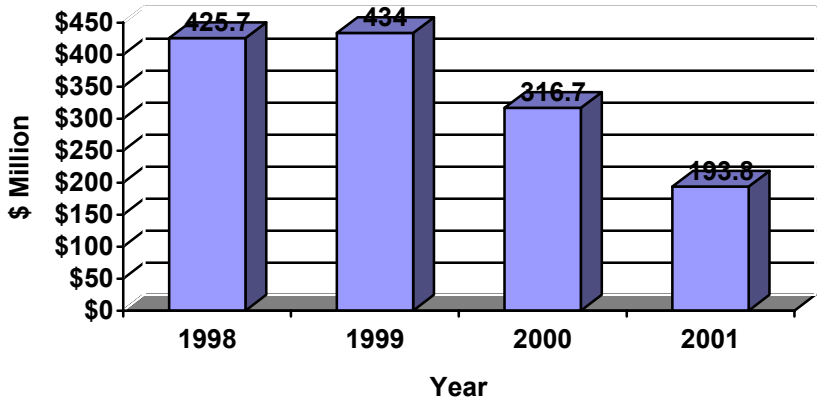
Chemicals - distributes chemicals to the petrochemical industry, and manufactures and distributes chemicals and active substances to the pharmaceutical industry

Financial Assets - manages investments in companies that mainly operate in the chemical industry

Number of Employees: 440

Sales

Net sales in 2001 were approximately $194 million, a 39% decrease from 2000 results.



Products

Target Botanicals used in Herbal Products- Ginkgo biloba

Contacts

Corporate Headquarters:

Schweizerhall Holding Inc.
4013 Basel
Switzerland

Phone: +41 61 326 81 11

Stada Arzneimittel AG
www.stada.de

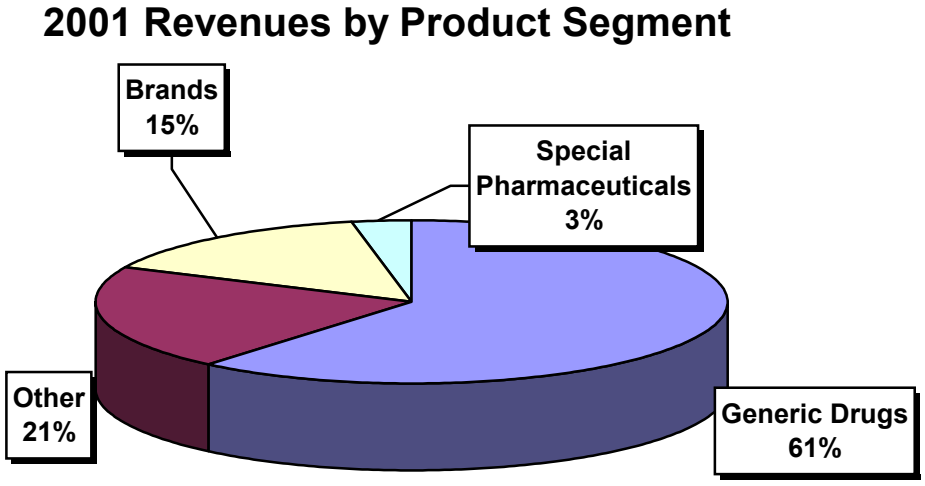
Company Background

Stada Arzneimittel AG, headquartered in Bad Vilbel, Germany, manufactures and distributes a variety of pharmaceutical products, mostly for the generic drug market. The company also develops, produces and distributes herbal remedies and publishes information on all current pharmaceuticals for medical professionals. Stada actively invests in foreign companies with operations in the cosmetics, fine chemicals and food additives/supplements industries. The group's main business focus is concentrated on three core segments: generic drugs, brand name products for the health market and special pharmaceuticals such as vaccines and cancer treatments.

Number of Employees: 1,827

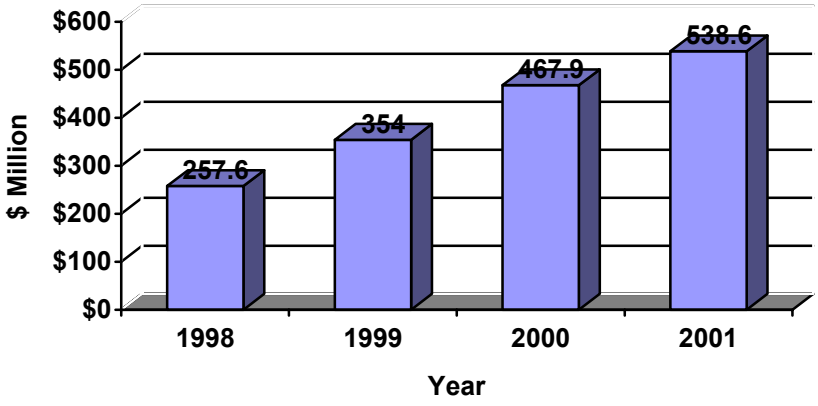
Distribution Channels

Stada distributes products through a network of worldwide subsidiaries. In 2001, generic drugs accounted for 61% of sale revenues.



Sales

Net sales in 2001 were approximately $538 million. This amount is a 15.1% increase from 2000 results.



Target Botanicals used in Herbal Products- Echinacea purpurea, Ginkgo biloba

Contacts

Corporate Headquarters:

Stada Arzneimittel AG
StadaStrasse 2-18
61118 Bad Vilbel
Germany

Phone: +49 6101 603-0

Trout Lake Farm LLC
www.troutlakefarm.com

Company Background

Trout Lake Farm LLC, located in Trout Lake, Washington, is the largest "Certified Organic" herb farm in the United States. In December 1998, the company was acquired by Alticor (Amway) Corporation for the purpose of vertically integrating the Nutrilite Division with its primary source of supply for medicinal herbs. Nutrilite is the largest manufacturer of branded vitamins and minerals in tablet or capsule form in the world. Trout Lake Farm grows more than 70 botanicals with the total harvest exceeding 3 million pounds per year.

Number of Employees: 20 - 1,200 (depending on the season)

Distribution Channels

Amway has become the world's largest direct-selling company. More than 3 million entrepreneurs in 49 markets distribute the company's products, including more than 200 food supplements.

Sales

Net sales (*sales to external customers*) in 2001 were approximately $3 million to $4 million.

Products

Brand Names- Nutrilite

Target Botanicals used in Herbal Products- Echinacea angustifolia, Echinacea purpurea

Contacts

Corporate Headquarters: Trout Lake Farm LLC
42 Warner Road
Trout Lake, WA 98650

Phone: 800-655-6988

Twinlab Corporation
www.twinlab.com

Company Background

Twinlab, (Nasdaq SC: TWINLAB) headquartered in Hauppauge, NewYork, is a leading manufacturer and marketer of brand name nutritional supplements sold through health and natural food stores, drug store chains, supermarkets, mass merchandise retailers and various direct sales channels. The company produces a full line of nutritional supplements, including vitamins, minerals, amino acids, fish and marine oils, sports nutritional products, herbal supplements and phytonutrients. A full line of herbal supplements and phytonutrients is marketed under the company's "Nature's Herbs" brand.

Number of Employees: 700

Recent News

July 2002
The company announced the consolidation of its manufacturing and distribution functions into the American Fork, Utah facility.

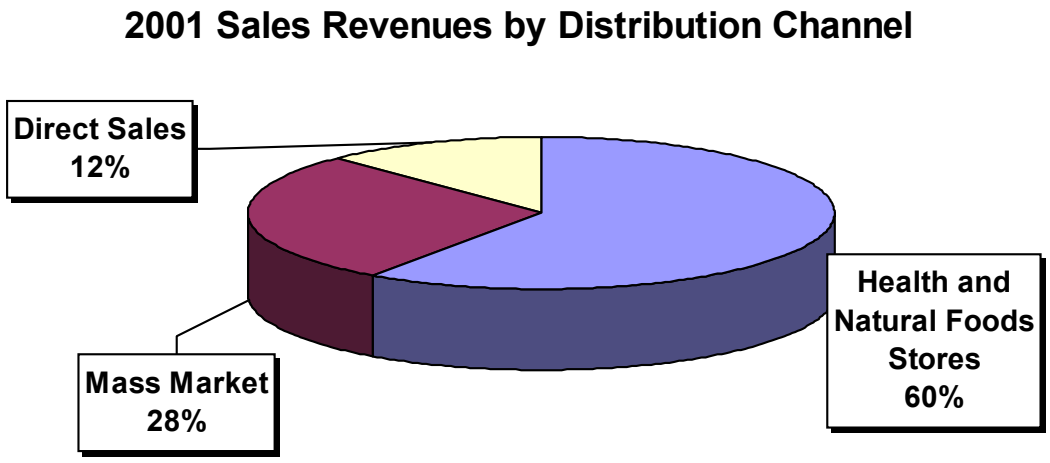
May 2002
The firm completed the sale of its Health Factors International subsidiary for about $2.1 million to Anabolic Laboratories Inc.

April 2001
Twinlab sold the assets of its Changes International and PR*Nutrition, Inc. subsidiaries to Goldshield Group PLC for approximately $4.9 million.

Distribution Channels

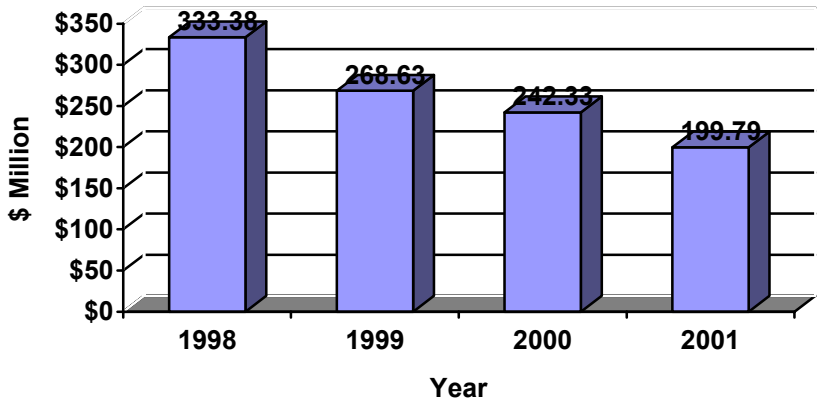
The company operates a multi-brand, multi-channel distribution system consisting of three channels. The Health and Natural Food Store Channel includes the company's Twinlab, Nature's Herbs, Ironman Triathlon and Alvita brand products. The Mass Market Channel consists of drug store chains, supermarkets and other mass merchandisers. In this channel, the

company offers Twinlab branded products and private label herbal products such as Wal-Mart's "Spring Valley" brand. In the Direct Sales Channel, the company markets and sells a variety of products directly to the consumer through network marketing, catalogs and the Internet.



Sales

Net sales in 2001 were about $200 million, a 17.6% decrease over 2000 results.



Products

Brand Names- Nature's Herbs, Alvita, Bronson, Twinlab: Cholesterol Success, Energy Fuel, Maxilife, Ironman Triathlon, Fuel, and Power Pro Fuel Bars

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, False unicorn, Ginkgo biloba, Goldenseal, Echinacea angustifolia, Echinacea purpurea, Skullcap, Wild indigo, Wild yam

Contacts

Corporate Headquarters: Twinlab Corporation
150 Motor Parkway Suite 210
Hauppauge, NY 11788
631-467-3140

Nature's Herbs: 600 East Quality Drive
American Fork, UT 84003
800-437-2257
www.Herbalvillage.com

U. S. Nutraceuticals LLC

www.usnutra.com

Company Background

U.S. Nutraceuticals LLC, located in Eustis, Florida, is a privately held, leading manufacturer of supercritical fluid extracts for the dietary supplement, nutraceutical and functional food industries. The company began in 1998 as a vertically integrated supplier of saw palmetto extracts and has become the largest vertically integrated manufacturer of saw palmetto extracts in the world. Through the use of its patented "Supure" extract process, the company expanded operations to include the production of standardized extracts from various natural sources for customers all over the world.

Recent News

Sept 2002

The company announced the purchase of the astaZANTHIN business of La Haye Laboratories, a privately held company located in Redmond, Washington, for an undisclosed amount.

Distribution Channels

The company distributes a large variety of botanical raw materials through its Botanics Company Division.

Products

Brand Names- astaZANTHIN, SuPure

Target Botanicals used in Herbal Products- American ginseng, Black cohosh, Bloodroot, Echinacea (angustifolia, pallida, purpurea), False unicorn, Goldenseal, Skullcap, Wild indigo, Wild yam

Contacts

Corporate Headquarters:

U.S. Nutraceuticals LLC
2751 Nutra Lane
Eustis, FL 32726

Phone: 352-357-2004

Botanics Company:

Chuck Wanser
Cwanzer@usnutra.com

Weider Nutrition International Inc.

www.weider.com

Company Background

Weider Nutrition International (NYSE: WNI), headquartered in Salt Lake City, Utah, develops, manufactures, markets, distributes and sells branded and private label vitamins, nutritional supplements and sports nutrition products throughout the world. The company reorganized in 2002 into three business units:

- The Schiff Specialty Unit- containing the brands Schiff and Move Free in addition to private label business limited to customers carrying the company branded products
- The Active Nutrition Unit- including the Weider Tiger's milk brands
- The Haleko Unit- the company's primary European subsidiary containing the Multipower and Multaben nutritional supplement brands, Venice Beach sportswear and private label businesses

Number of Employees: 755

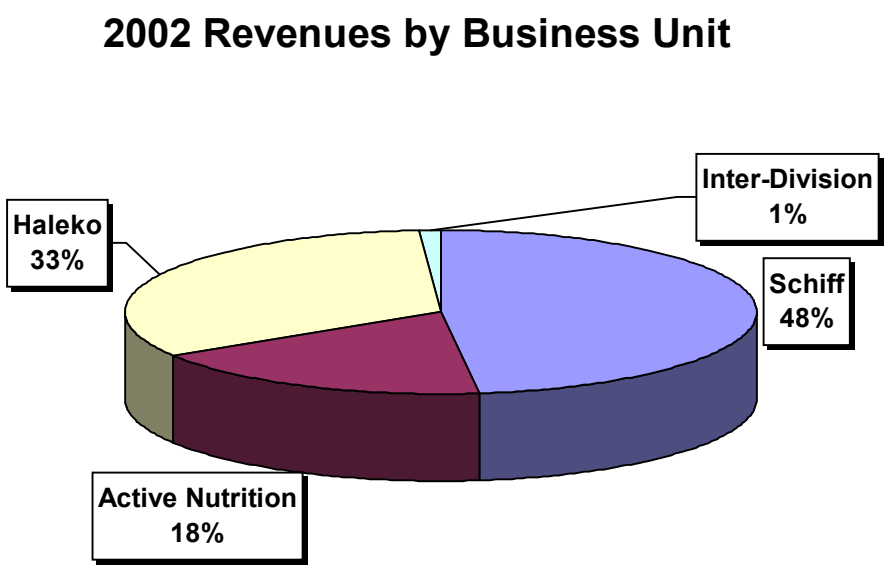
Recent News

July 2002

The company announced the sale of the American Body Building and Science Foods brands for $5.6 million.

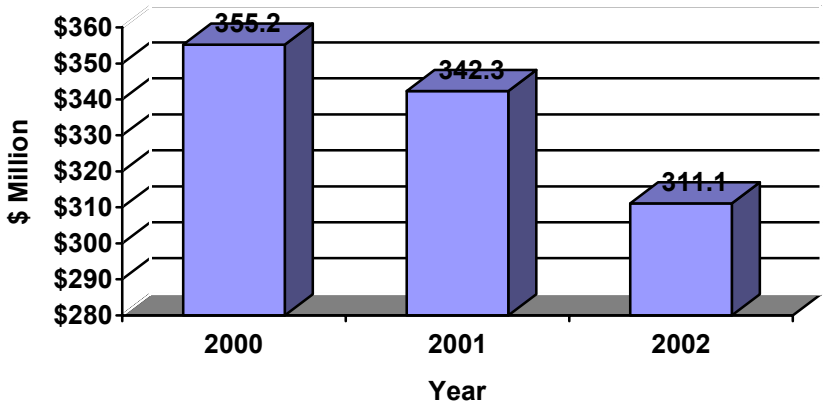
Distribution Channels

Weider distributes herbal products primarily through the Schiff brand to retail outlets in all 50 states and Europe. Customers tied to the company's branded products are also provided the opportunity to add private label items manufactured by the company to their inventories. In fiscal 2002, Schiff branded products accounted for about 48% of sales revenues.



Sales

Sales revenues in 2002 continued to decline to about $311 million.



Products

Brand Names- Schiff, Weider, Multipower, Multaben, Move Free, Tiger's Milk, Venice Beach

Target Botanicals used in Herbal Products- Echinacea purpurea

Contacts

Corporate Headquarters:

Weider Nutrition International Inc.
2002 South 5070 West
Salt Lake City, Utah 84104-4726

Phone: 801-975-5000