AHPA

AMERICAN HERBAL PRODUCTS ASSOCIATION

Tonnage Surveys of Select North American Wild-Harvested Plants, 2006–2010

Prepared for AHPA and its members by:

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Introduction

This report presents the findings of surveys conducted by the American Herbal Products Association (AHPA) to quantify annual harvests of certain North American herbs in commerce. The specific focus of these surveys was on the harvests in each of the five years from 2006 to 2010 of those plants that are used as ingredients in herbal products and that are subject to, for at least some part of their market demand, harvest from wild (uncultivated) populations.

AHPA has previously published tonnage data on these plants,[1,2,3,4,5] starting with a survey of wild and cultivated harvest quantities of goldenseal (*Hydrastis canadensis*) and a number of other plants. Data covered in these past surveys included harvest years from 1997 through 2005. Though full results of the past surveys are available in previous publications, the current report includes some of these data as well.

The new data included here represent aggregate quantities of harvest data provided to AHPA by companies that serve as raw material suppliers to this particular trade. For each of the commodities that are the subject of this report, respondents were asked to provide information on the amounts of both cultivated and wild-harvested material, and of both fresh (i.e., not dehydrated) and dried material. Thus, although this report is titled *Tonnage Survey of Select North American Wild-Harvested Plants, 2006-2010*, the information contained here includes both fresh and dried quantities of wild-harvested supplies (if both were reported), as well as fresh and dried quantities of cultivated material (if any).

Harvest data are presented here for 26 botanical commodities, representing 22 different plant species. Information was solicited for a single commodity for each of the following species: aletris (*Aletris farinosa*) root; arnica (*Arnica* spp.) any plant part; bethroot (*Trillium erectum*) root; black cohosh (*Actaea racemosa* syn. *Cimicifuga racemosa*) root and rhizome; bloodroot (*Sanguinaria canadensis*) root; blue cohosh (*Caulophyllum*

[1] American Herbal Products Association. *1998 Goldenseal Survey Results*. Silver Spring, MD: AHPA; 1999.
[2] American Herbal Products Association. *1999 Tonnage Survey Report*. Silver Spring, MD: AHPA; 2000.
[3] American Herbal Products Association. *Tonnage Survey of North American Wild-harvested Plants, 2000-2001*. Silver Spring, MD: AHPA; 2003.
[4] American Herbal Products Association. *Tonnage Survey of Select North American Wild-harvested Plants, 2002-2003*. Silver Spring, MD: AHPA; 2006.
[5] American Herbal Products Association. *Tonnage Survey of Select North American Wild-harvested Plants, 2004-2005*. Silver Spring, MD: AHPA; 2007.

thalictroides) root; cascara sagrada (*Frangula purshiana* syn. *Rhamnus purshiana*) bark; false unicorn (*Chamaelirium luteum*) root; lady's slipper (*Cypripedium* spp.) root; lomatium (*Lomatium dissectum*) root; osha (*Ligusticum porteri*) root; saw palmetto (*Serenoa repens*) fruit; slippery elm (*Ulmus rubra*) bark; sundew (*Drosera* spp.) herb; usnea (*Usnea* spp.) lichen; Venus flytrap (*Dionaea muscipula*) whole plant; Virginia snakeroot (*Aristolochia serpentaria*) root; and wild yam (*Dioscorea villosa*) root. In order to provide a longer-term context for the current survey, much of the data from AHPA's earlier surveys are included in this report.

Data for goldenseal (*Hydrastis canadensis*) and three species of *Echinacea* are provided for both the root and the herb (defined for the purposes of this survey as any and all above-ground parts of the plant). In addition, harvest data was collected for American ginseng (*Panax quinquefolius*) root, but it is not presented in this report, as AHPA believes that more complete harvest data has been collected for this plant by the U.S. Fish and Wildlife Service. Updated annual harvest information for this commodity may be provided in the next survey report.

Administration of the Surveys

AHPA developed, conducted, and tabulated the results of two new individual two-part surveys designed to quantify the annual harvest of 26 botanical commodities for harvests conducted from 2006 through 2010. Each of these surveys was distributed via email as an *AHPA Update* to all AHPA members (approximately 200 herbal companies), the first of the two in September of 2008 covering harvest years 2006 and 2007, and the second in July of 2011 covering harvest years 2008, 2009, and 2010. Each company that participated in the 2004 – 2005 survey that did not initially respond was also contacted via phone and email in an attempt to enlist their support for the present efforts.

Many AHPA members do not trade in these plants. Others, while they may use some of the plants that were the subject of these surveys as ingredients in their products, are not involved in the actual production of the raw materials in either a wild-harvest or cultivation capacity. Each survey requested full participation only from companies involved in the actual production of raw materials.

For the purpose of these surveys, the term "primary raw material producer" was defined to mean individuals or companies that obtain plant material directly from a wild or cultivated source or by contracting, purchasing and/or consolidating these plants from another individual or company who harvests them directly and who was not likely to fill out the survey. As defined in the survey, a "primary raw material producer" could include companies that use the plants directly (e.g., to manufacture herbal extracts for sale to other manufacturers, or to manufacture finished products), and could also include companies that simply sell the raw material to other companies.

This somewhat complex definition was necessitated by an intention to count wild-harvested raw materials once and only once, and to minimize duplicate reporting of the same lot of goods at its various distribution stages. The age-old structure of the harvest-to-market movement of wild-harvested plants relies on a series of supply and purchase points. Materials move from the actual collector to a "country dealer" located in a community near the harvest area, and then they are consolidated on a somewhat regional basis. The regional consolidators, who also serve as direct purchasers from collectors in their immediate community, serve as clearinghouses for the collected goods. They grade, sort, clean, and pack the raw materials that they have purchased from direct collectors and local dealers and then sell these goods, either directly to a manufacturer or to a bulk distributor who will sell to manufacturers, sometimes after further processing (e.g., grinding). Although some manufacturers purchase directly from collectors or "country dealers," such purchases are believed to represent an insignificant portion of most wild-harvested goods.

In an ideal system to quantify harvests of any plant commodity, data would be produced either at the point of harvest (with each and every collector) or at the point at which every consolidated lot of material comes into a certain defined stage of commerce (e.g., the finished product manufacturer). AHPA does not have access to the multitude of individual collectors, but does count among its members and non-member acquaintances most of the regional consolidators of North American wild-harvested herbs, as well as most of the bulk distributors and manufacturers. These regionally located companies were identified as the key respondents and were therefore the focus of AHPA's active solicitation as participants in the surveys.

AHPA requested that any company that received a survey and did not meet the definition of a "primary raw material producer" should not return the survey. "Primary raw material producers" were requested to provide harvest data for each of the identified commodities in which they had engaged in trade during 2006 and/or 2007 for the September 2008 survey, and 2008, 2009, and/or 2010 for the June 2011 survey. Participation by any respondent was entirely voluntary.

Response Rate and Limitations

AHPA received survey information from 22 and 23 primary raw material producers of the botanical commodities that were the subject of the 2006 – 2007 and 2008 – 2010 surveys, respectively. This constitutes four companies that had previously reported tonnage amounts for the 2004 – 2005 survey but that did not participate in the 2006 – 2007 survey. One of these companies ceased being a primary raw material producer, and another may represent a loss of a ton or two of goldenseal root harvest data.

Additionally, one company that provided general harvest information on one specific commodity was counted among the 26 responders for the 2004 – 2005 survey but was not counted for the 2006 – 2010 surveys, as they were not reporting individual harvest data. The effect of discounting them was offset by another company returning after a reporting hiatus.

Three companies that contributed to the 2006 – 2007 survey did not participate in the 2008 – 2010 survey. One was no longer considered a primarily raw material producer, and another's production had shifted to culinary herbs only. Four other companies contributed in their place. None of these fluctuations in the pool of participation produced major changes in any of the high volume commodity tonnage data.

AHPA does not have knowledge of exactly how many individuals and firms are engaged in the business of collecting the wild plants that are the subject of these surveys, and so does not have certain information as to what proportion of total trade in these plants is represented in them. Consequently, some of the trends discussed herein may have been affected by this inconsistency in the identity of respondents. Finally, AHPA has no means of assuring that information provided by respondents is accurate.

Table 1 – Aggregate Harvest of DRIED Plants for 1999 – 2010 (In Pounds)

article of commerce		aletris root[1]	arnica, any part	bethroot root	black cohosh root & rhizome	bloodroot root	blue cohosh root	cascara sagrada bark	*Echinacea angustifolia* root	*Echinacea angustifolia* herb[4]
Latin binominal		*Aletris farinosa*	*Arnica* spp.	*Trillium erectum*	*Actaea racemosa*[2]	*Sanguinaria canadensis*	*Caulophyllum thalictroides*	*Frangula purshiana*[3]	*Echinacea angustifolia*	*Echinacea angustifolia*
2010	**cult.**	11	561	0	9,862	0	0	0	96,735	0
	wild	512	224	594	314,695	4,266	8,803	347,238	47,615	3,599
2009	**cult.**	0	780	0	1,387	0	0	0	95,717	42,492
	wild	344	269	402	168,668	3,306	4,369	405,780	24,558	5,997
2008	**cult.**	0	377	0	1,597	35	160	0	46,174	26,480
	wild	1,645	1,525	2,403	286,180	5,205	3,934	402,313	26,891	568
2007	**cult.**	0	568	0	2,231	5	102	0	20,942	8,597
	wild	369	532	827	343,771	6,019	4,455	348,901	32,143	3,304
2006	**cult.**	0	85	0	2,040	50	79	0	65,289	24,062
	wild	579	1,025	2,999	307,497	6,486	4,282	327,129	36,061	1,235
2005	**cult.**	2	719	0	6,930	0	126	45	38,169	11,986
	wild	510	98	1,038	136,370	5,328	8,039	222,867	20,152	2,100
2004	**cult.**	50	279	0	3,312	0	207	21	90,469	23,322
	wild	571	27	475	318,729	11,487	5,054	144,279	8,512	1,100
2003	**cult.**	0	N/S	0	410	20	86	0	46,210	9,500
	wild	546	N/S	1,469	318,143	39,590	7,627	167,319	64,594	6,636
2002	**cult.**	0	N/S	0	282	26	80	0	40,396	9,280
	wild	1,326	N/S	1,471	169,436	26,473	4,449	96,790	37,980	600
2001	**cult.**	0	N/S	0	6,521	19	90	223	36,081	7,000
	wild	2,109	N/S	1,040	177,681	41,236	8,085	198,917	33,554	2,000
2000	**cult.**	0	N/S	0	149	0	0	0	38,778	11,167
	wild	1,508	N/S	1,911	117,843	48,674	5,506	235,194	9,337	1,300
1999	**cult.**	N/S	N/S	N/S	2,600	N/S	N/S	26,880	219,211	24,108
	wild	N/S	N/S	N/S	145,367	N/S	N/S	242,339	49,984	0

Note: N/S indicates that this commodity was not included in the survey for the year indicated.

[continues …]

1. Also known as true unicorn root. 2. Also known as *Cimicifuga racemosa*. 3. Also known as *Rhamnus purshiana*. 4. Any/all above ground parts.

Table 1 – Aggregate Harvest of DRIED Plants for 1999 – 2010 (In Pounds) *[… continued.]*

article of commerce		*Echinacea pallida* root	*Echinacea pallida* herb[4]	*Echinacea purpurea* root	*Echinacea purpurea* herb[4]	false unicorn root[5]	goldenseal root & rhizome	goldenseal leaf	lady's slipper root	lomatium root
Latin binominal		*Echinacea pallida*	*Echinacea pallida*	*Echinacea purpurea*	*Echinacea purpurea*	*Chamaelirium luteum*	*Hydrastis canadensis*	*Hydrastis canadensis*	*Cypripedium* spp.	*Lomatium dissectum*
2010	**cult.**	956	0	188,748	212,370	0	17,931	782	0	0
	wild	0	0	3,616	0	4,266	59,197	10,791	26	2,693
2009	**cult.**	2,661	0	78,865	170,492	0	18,354	1,586	0	0
	wild	0	0	276	15,000	3,306	54,460	8,354	12	626
2008	**cult.**	2,000	2,012	87,263	89,098	35	16,698	425	0	0
	wild	0	0	80	0	5,205	71,155	11,332	69	120
2007	**cult.**	11	0	35,122	151,411	59	17,146	1,354	0	0
	wild	2,276	2,147	1,000	0	3,628	70,129	9,817	0	198
2006	**cult.**	0	0	165,270	136,546	45	12,406	1,622	0	0
	wild	1,233	550	0	0	6,300	61,170	17,133	135	407
2005	**cult.**	61	2,850	22,908	242,844	1,043	33,756	7,092	15	0
	wild	30	0	1,000	102,340	4,945	47,714	6,939	0	816
2004	**cult.**	45	0	275,412	936,900	1,034	21,000	5,178	123	0
	wild	2,252	0	0	0	3,838	61,160	2,495	135	647
2003	**cult.**	0	0	85,513	258,583	1,400	11,070	2,435	286	0
	wild	15,355	50	5,080	50	4,839	31,802	6,869	5	641
2002	**cult.**	2,500	0	76,104	303,973	1,400	15,779	8,926	110	0
	wild	32,849	0	3,583	0	5,086	41,845	16,612	0	710
2001	**cult.**	0	0	50,156	8,634	700	21,337	4,941	210	0
	wild	14,092	0	0	0	4,735	105,099	47,558	113	108
2000	**cult.**	0	0	53,291	398,382	700	18,963	4,248	0	0
	wild	11,000	0	2,545	0	3,730	70,396	18,770	95	91
1999	**cult.**	3,100	0	390,066	1,591,922	N/S	47,559	5,487	N/S	N/S
	wild	0	0	0	0	N/S	91,435	87,524	N/S	N/S

Note: N/S indicates that this commodity was not included in the survey for the year indicated.

4. Any/all above ground parts. 5. Also known as helonias.

[continues …]

Table 1 – Aggregate Harvest of DRIED Plants for 1999 – 2010 (In Pounds) *[… continued.]*

article of commerce		osha root	saw palmetto fruit[6]	slippery elm inner bark	sundew, all parts	usnea lichen	Venus flytrap whole plant	Virginia snakeroot root	wild yam tuber
Latin binominal		*Ligusticum porteri*	*Serenoa repens*	*Ulmus rubra*	*Drosera* spp.	*Usnea* spp.	*Dionaea muscipula*	*Aristolochia serpentaria*	*Dioscorea villosa*
2010	**cult.**	35	2,704	0	0	25	0	0	0
	wild	2,853	1,461,125	329,002	0	567	0	59	42,062
2009	**cult.**	25	2,201	0	0	25	0	0	0
	wild	1,879	1,581,106	199,625	0	963	0	39	59,193
2008	**cult.**	0	4,001	0	0	30	0	0	120
	wild	1,993	2,644,813	352,727	0	1,458	0	73	36,800
2007	**cult.**	0	3,600	4,902	0	0	0	0	106
	wild	2,309	4,199,658	342,621	0	1,887	0	18	23,855
2006	**cult.**	0	1,500	1,935	0	0	0	0	130
	wild	1,440	2,277,504	297,061	0	1,626	0	27	26,550
2005	**cult.**	350	2,308	1,731	0	0	0	0	363
	wild	1,642	5,786,806	203,984	0	1,761	0	59	33,003
2004	**cult.**	2	1,065	803	0	0	0	0	412
	wild	683	2,918,940	78,380	0	940	0	353	27,616
2003	**cult.**	400	0	0	0	0	N/S	0	42
	wild	969	3,397,465*	229,866	0	1,158	N/S	135	37,021
2002	**cult.**	400	30,855	0	0	0	N/S	0	54
	wild	323	2,877,519	202,309	0	1,134	N/S	40	31,573
2001	**cult.**	0	0	0	0	0	N/S	0	356
	wild	521	2,206,157**	197,634	0	832	N/S	17	37,899
2000	**cult.**	0	18	0	0	0	N/S	0	10,055
	wild	577	4,663,613**	148,387	0	738	N/S	287	32,358
1999	**cult.**	2,000	444,000	10,200	N/S	N/S	N/S	N/S	100
	wild	11,500	1,082,594	255,839	N/S	N/S	N/S	N/S	58,544

Note: N/S indicates that this commodity was not included in the survey for the year indicated.

6. Some reported saw palmetto fruit fresh harvest amounts for 2008-2010 were converted to dry harvest for this table by dividing by 3.3.

* Revised upward due to reported values in addition to those reported in the 2004-2005 survey.

** Adjusted upward to reflect conversion of previously reported fresh harvest values to equivalent dry weights.

Table 2 – Aggregate Harvest of FRESH Plants for 2004 – 2010 (In Pounds)

	2010		2009		2008		2007		2006		2005		2004	
commodity	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**
aletris root[1] *(Aletris farinosa)*	15	22	0	80	0	229	0	0	0	0	0	12	0	0
arnica, any part *(Arnica* spp.)	67	59	20	15	0	75	35	0	20	35	191	0	135	41
bethroot root (*Trillium erectum*)	11	0	0	0	0	0	0	22	0	6	0	6	0	7
black cohosh root & rhizome (*Actaea racemosa*)[2]	0	1,707	0	239	0	3,177	63	9,632	35	55	0	10,072	145	12,820
bloodroot root (*Sanguinaria canadensis*)	0	59	0	33	0	73	0	45	0	14	0	23	0	41
blue cohosh root (*Caulophyllum thalictroides*)	16	5	0	50	0	550	0	0	0	0	0	0	0	0
***Echinacea angustifolia* root**	2,316	20,200	1,110	15,014	1,983	15,110	0	100	8,511	200	4,666	17	440	85
***Echinacea angustifolia* herb**[3]	0	0	0	0	0	5	0	0	0	0	200	0	20	0
***Echinacea pallida* root**	0	0	0	0	0	0	0	8	0	75	0	8	0	37
***Echinacea pallida* herb**[3]	0	0	0	0	0	0	0	0	0	0	220	0	0	0
***Echinacea purpurea* root**	3,859	300	6,793	0	8,006	0	6,099	0	10,109	0	2,502	0	4,408	0
***Echinacea purpurea* herb**[3]	818,069	10	577,711	0	191,964	0	11,251	0	12,054	0	9,009	0	6,730	0

Note: N/S indicates that this commodity was not included in the survey for the year indicated.

1. Also known as true unicorn root. 2. Also known as *Cimicifuga racemosa*. 3. Any/all above ground parts.

[continues …]

Table 2 – Aggregate Harvest of FRESH Plants for 2004 – 2010 (In Pounds) [… *continued.*]

	2010		2009		2008		2007		2006		2005		2004	
commodity	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**	**cult.**	**wild**
false unicorn root[4] (*Chamaelirium luteum*)	0	43	0	0	0	40	0	39	18	0	1,059	0	927	0
goldenseal root (*Hydrastis canadensis*)	124	0	125	0	135	0	44	890	150	745	217	2,303	65	1,771
goldenseal leaf (*Hydrastis canadensis*)	0	0	0	0	0	297	0	0	0	0	125	0	120	0
lomatium root (*Lomatium dissectum*)	0	576	0	759	0	403	0	97	110	673	78	893	90	467
osha root (*Ligusticum porteri*)	40	1,942	25	870	0	273	22	0	0	130	65	0	60	0
saw palmetto fruit (*Serenoa repens*)	0	1,078	0	441	0	1,020	0	1,200	0	660	0	1,149	120	4,034
slippery elm bark (*Ulmus rubra*)	0	96	0	88	0	356	0	55	0	0	0	74	0	0
usnea lichen (*Usnea* spp.)	0	0	0	0	0	0	0	0	0	0	0	30	0	108
Venus flytrap, whole plant (*Dionaea muscipula*)	30	0	75	0	50	0	66	0	30	0	60	0	28	0
wild yam tuber (*Dioscorea villosa*)	0	70	0	0	0	148	62	0	0	45	0	0	0	28

Note: N/S indicates that this commodity was not included in the survey for the year indicated.
4. Also known as helonias.

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CHART 1

Four High-Volume Commodities, 1999 – 2010 (Wild and Cultivated Combined)

Black cohosh root and slippery elm bark harvests rebound after depressed harvests in 2009, cascara sagrada reaches new peak, then returns to 2006 and 2007 harvest levels, while goldenseal root harvests remain relatively stable.

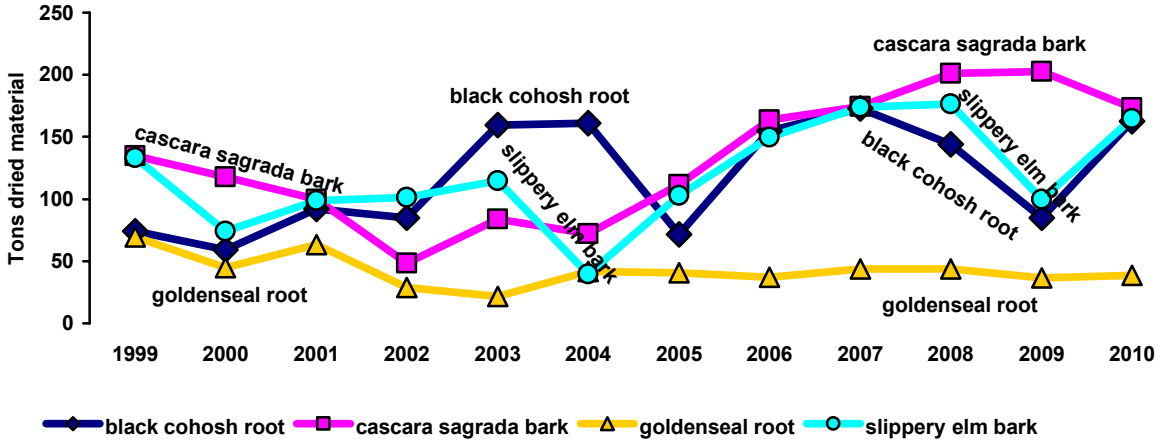
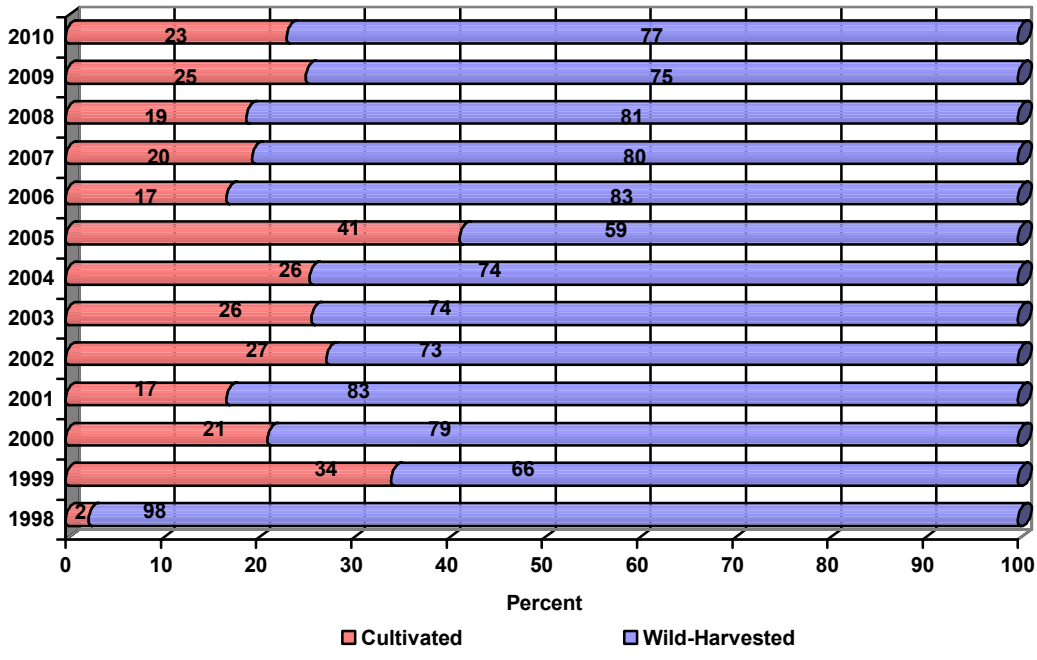


CHART 2

Percent Cultivated *vs*. Wild Goldenseal Dried Root Harvests for 1998 – 2010



Analysis of the Surveys for DRIED Plant Material

All of the aggregate data received from respondents and related to dried (dehydrated) plant material is presented in Table 1. In order to provide some context to evaluate harvest trends, harvest data from previous AHPA surveys are included in this table. Thus, a twelve-year overview from 1999 – 2010 is provided for many dried plant commodities that were the subject of each of the AHPA surveys conducted over these years. For further background discussion of events influencing older harvest data, and harvest data for 1997 and 1998, see *AHPA's Tonnage Survey of Wild-Harvested North American Plants, 2004-2005*.

Chart 1 presents the data behind the observations of the highest volume harvests among the dried herbs that are the subject of this survey. The combined wild and cultivated harvest tonnages for black cohosh root,* cascara sagrada bark, goldenseal root,* and slippery elm bark are shown for years 1999 – 2010. Starting with black cohosh harvests, the drop reported in 2005 to 72 dried tons of combined cultivated and wild root back to levels reported for years 1999 – 2002 was followed by increases to approximately 155 dried tons in 2006 and 173 dried tons in 2007. This increase was then followed by a decline to a low of 85 tons reported harvested in 2009, but then reversed itself with 2010's harvest of 162 tons, back to the 2006 – 2007 levels, which were on par with the approximately 160 tons reported for both 2003 and 2004. Overall, a sustained strong market is suggested by the harvests reported for this commodity.

The effect of the removal of cascara sagrada bark extracts from the over-the-counter (OTC) drug marketplace as a laxative ingredient in late 2002† does not seem to have had a lasting, if any, negative impact on the harvest tonnage reported for cascara sagrada dried bark. The 2006, 2007, and 2008 reported harvests of 164, 175, and 201 respective tons continued a five-year upward trend to a new reported high of 203 tons in 2009. 2010 saw a drop back to 174 tons, which is on par with previously reported high-volume cascara sagrada bark harvest years.

* The use of the term "root" with black cohosh root and goldenseal root refers to both root and rhizome.
† "Status of Certain Additional Over-the-Counter Drug Category II and III Active Ingredients; Final rule," 67 Federal Register 90 (9 May 2002), pp. 31125 - 31127.

The slippery elm dried bark reported harvest rose to 103 tons in 2005 from 40 dried tons in 2004 and continued trending upward with 150, 174, and 176 reported tons harvested in 2006, 2007, and 2008, respectively. This was followed by a drop in the reported harvest value to 100 tons in 2009, followed by a rebound to 165 reported tons in 2010.

The combined wild and cultivated dried goldenseal root reported harvests varied between 36 and 44 tons for harvest years 2004 – 2010, averaging about 40 tons per year, up from the reported low of 21 dried tons for 2003 (see also Chart 9). The cultivated portion of the total harvest remained between 17 to 25 percent of the total for the 2006 – 2010 harvest years (Chart 2), similar to years 2000 – 2004. The percent of cultivated dried goldenseal root harvest was reported as 34 and 41 percent in 1999 and 2005, respectively, and only 2 percent in 1998.

The remarkable stability of the combined totals for the reported wild and cultivated goldenseal root harvests may be related to a relatively consistent market demand. The dried volumes of this commodity for 1999 through 2010 harvest years can be seen below in Chart 3 for reported wild harvests and Chart 4 for reported cultivated harvests.

CHART 3

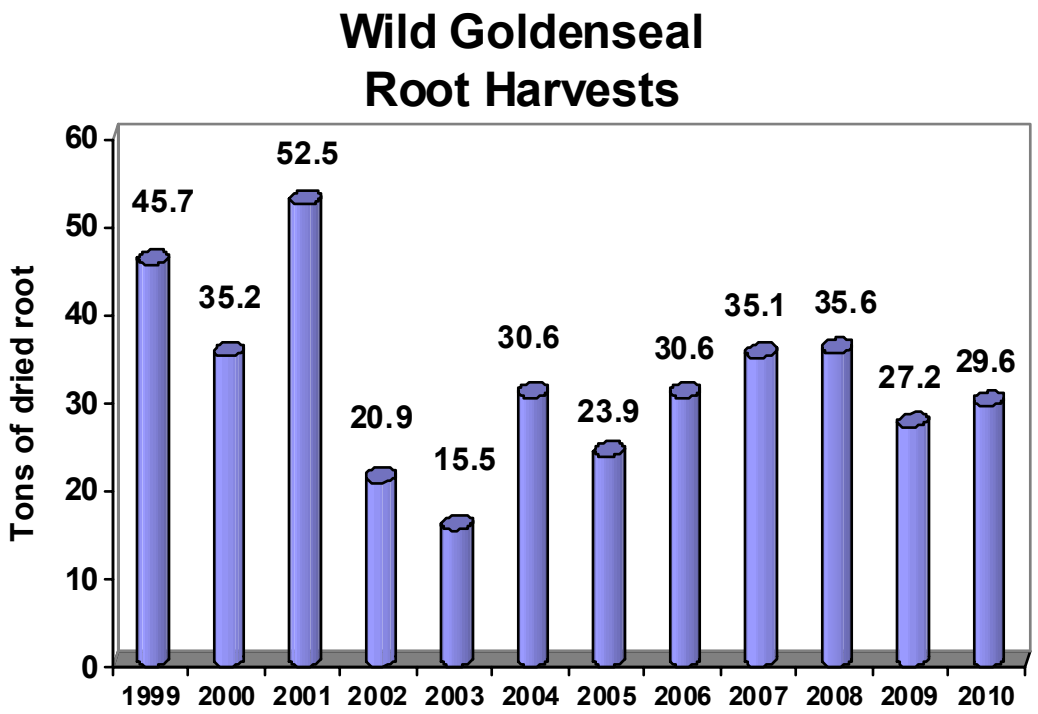


CHART 4

Cultivated Goldenseal Root Harvests

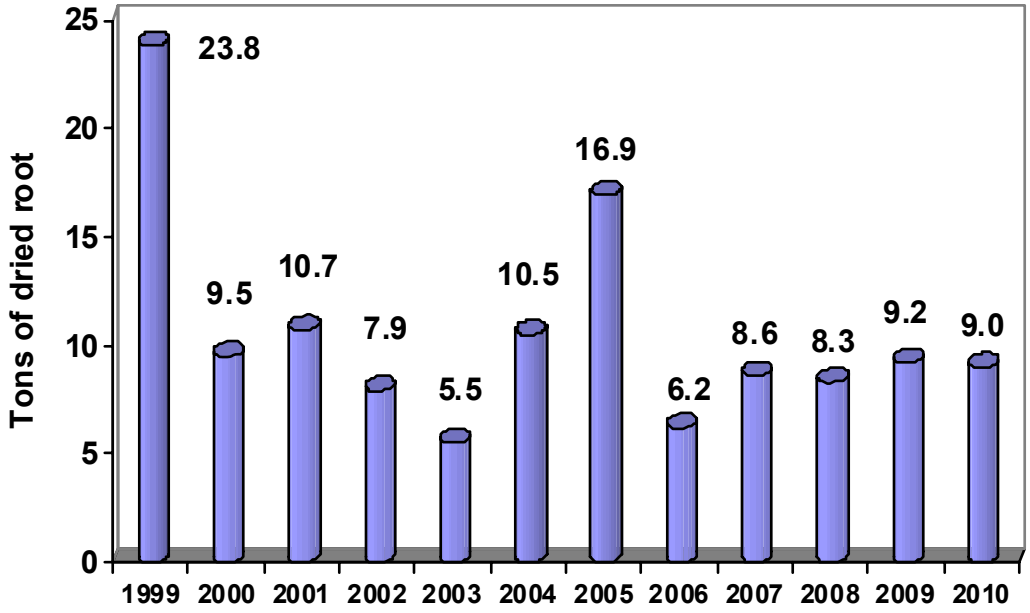


CHART 5

Echinacea spp. Dried Root Harvest for 1999 – 2010 (Wild Only)

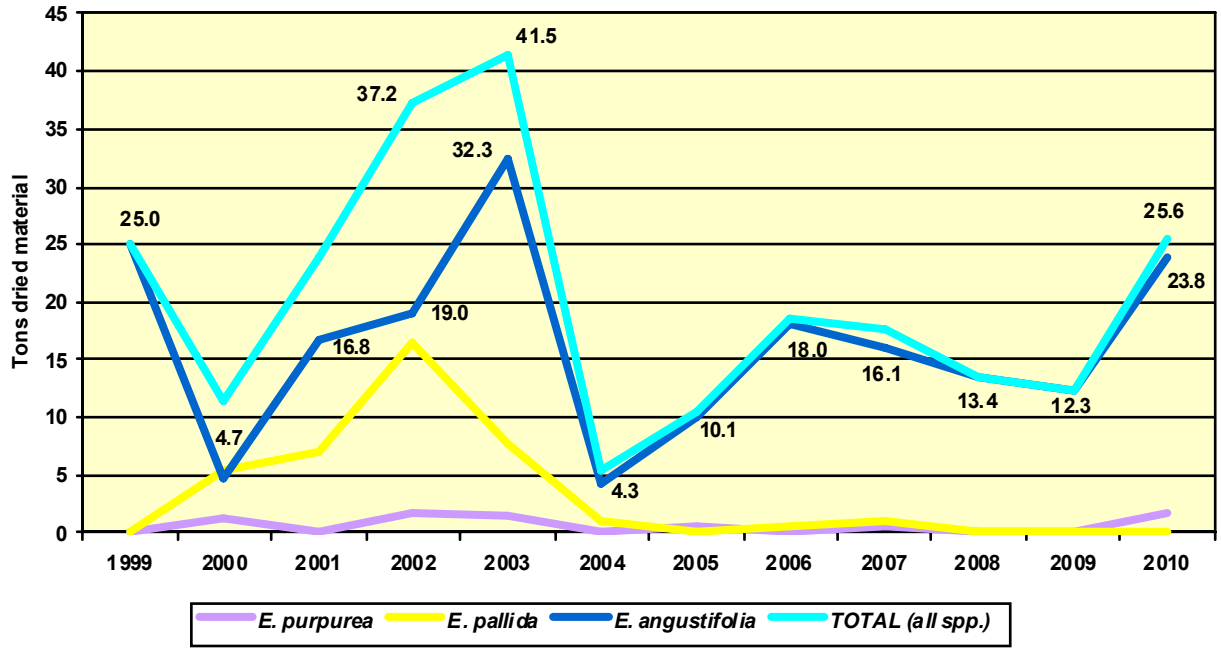
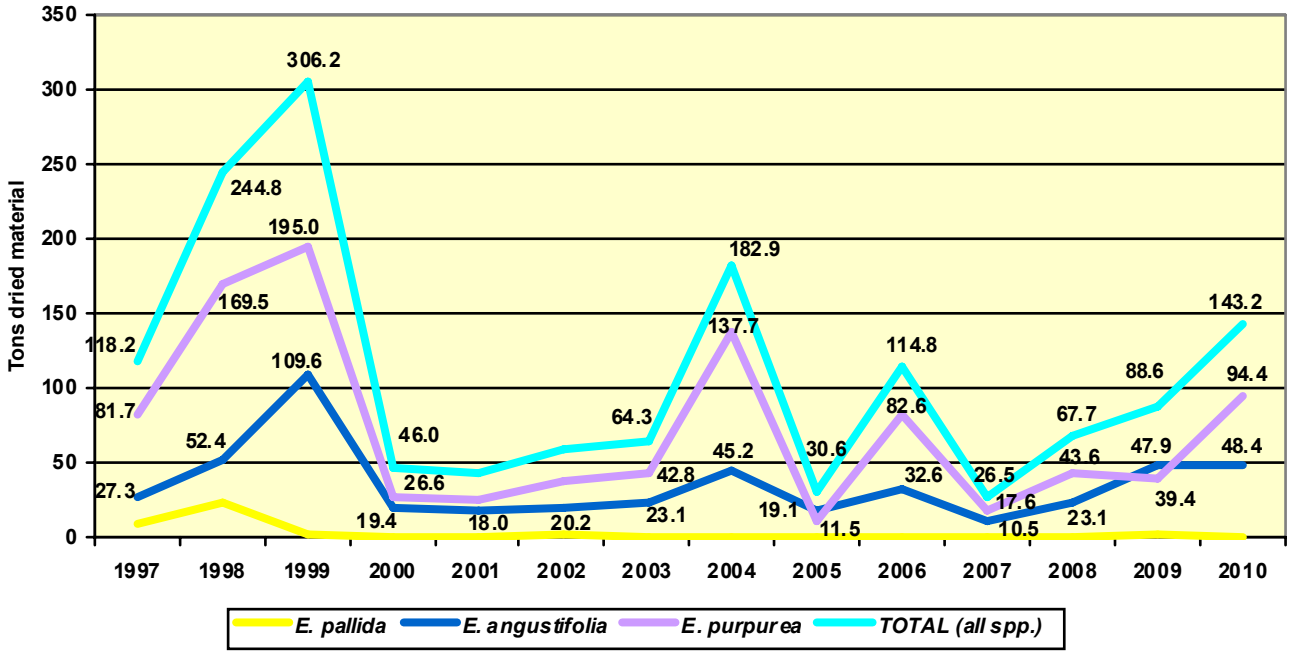


CHART 6

Echinacea spp. Dried Root Harvest for 1997 – 2010 (Cultivated Only)



Since 2004, *E. angustifolia* continues to be the only *Echinacea* species for which any meaningful volumes of wild-harvested dried root was reported. As Chart 5 shows, this commodity dropped from 32 tons in 2003 to 4 tons in 2004, and rose to 18 tons by 2006, then declined to 12 tons in 2009 before rising to a 24 ton harvest in 2010. The reported 1998 dry root *E. angustifolia* harvest of 113 tons (data from previous surveys) remains an anomaly likely due to the extraordinary marketplace demand for herbs at that time.

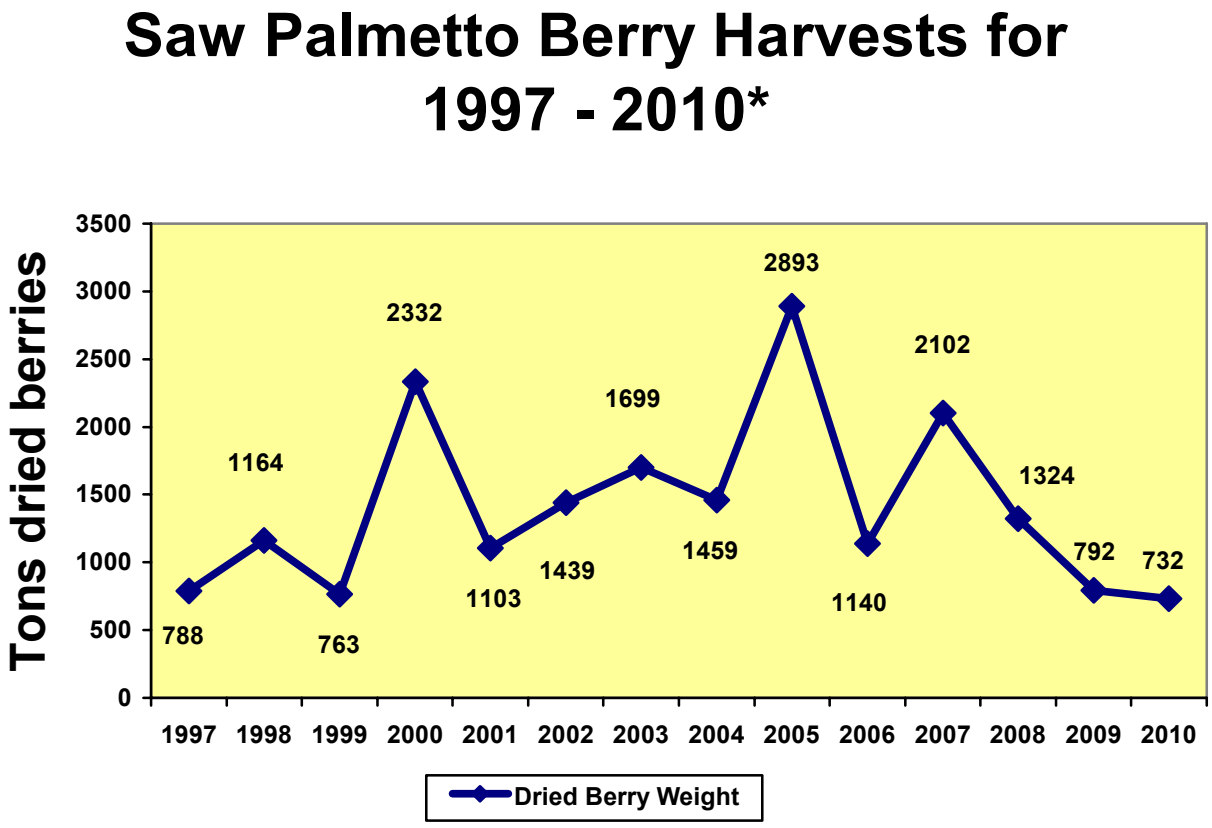
The reported harvest of cultivated dried *E. angustifolia*, like *E. purpurea*, displayed a sawtooth pattern for the 2003 – 2007 harvest years, after which it rose to 48 dried tons for 2009 and 2010, as can be seen in Chart 6 above. The magnitude of these cultivated *E. angustifolia* dried root harvests exceeds the 2004 value of 45 dried tons, and are the largest reported harvests for this commodity since 1998 – 1999.

The *E. purpurea* dried cultivated harvests reported amounts resulted in a larger double dip than exhibited by dried cultivated *E. angustifolia* root for harvest years 2005 and 2007, followed by a smaller echo for 2008 – 2009, before rising to a reported harvest of 94 dried tons in 2010. This is a dramatic increase not seen since 2004 and the 1998 – 1999

harvest years before that. The oscillating fluctuation of these reported cultivated harvests for 2003 – 2007 is consistent with general industry purchasing realities of inventory supply and market prices. It is not known if these factors are responsible for harvest fluctuations, but it is notable that a general upward trend has emerged.

Underreporting of the saw palmetto berry harvests is a certainty. The numbers reflected in this survey are missing one supplier that hasn't participated since the 2004 – 2005 survey, and the 2004 – 2005 numbers themselves were considered by industry sources to be at least 30% lower than the actual harvest. One reasonable estimate is that the saw palmetto berry harvest data captures approximately 50% of the total harvest in dry berry weight. The 2009 - 2010 reported harvest data show a tapering off of dried berry tonnage to levels not seen since 1997 and 1999. Reported fresh values were negligible, as were reported cultivated values. Virtually all saw palmetto berries are collected from existing stands that do not require cultivation.

CHART 7



*The loss of a participating company is reflected for the 2006-2010 harvest values over earlier reports. 2000-2001 harvest values include reported fresh harvests converted to dried berries for this chart. Actual total harvests may be more than double for this important commodity.

The 14 other species addressed in these surveys recorded much lower dried harvest quantities than the high-volume species discussed above. Details for harvest data on cultivated and wild dried harvests of these 14 species can be seen in Table 1.

The aletris root dried wild 2000 harvest was recorded at about three quarters of a ton, a ton in 2001, and 1,326 pounds in 2002. Reported harvests for 2003—2010 remained at about a quarter ton with exceptions of under 400 pounds for 2007 and 2009, and 1,645 dried pounds reported in 2008. Reports of cultivated aletris root harvests have been sporadic with 50, 2, and 11 dried pounds reported for 2004, 2005, and 2010, respectively.

Arnica herb harvest, introduced to this survey in 2004, initially reported minimal wild harvests for 2004 and 2005 (27 pounds for 2004 and 98 pounds for 2005) and came in with one half ton and one quarter ton wild harvests for 2006 and 2007, respectively. Three quarters of a ton wild harvest was reported for 2008 with an average of 250 pounds of wild harvested arnica for 2009 and 2010. Cultivated dried arnica herb material reported harvests of 279 pounds in 2004, 719 pounds in 2005, and only 85 pounds in 2006. For the 2007 – 2010 harvest years, this cultivated dried commodity registered between 400 and 800 pounds annually.

Bethroot root harvests have always been reported as wild only, and ranged from a high of a ton and a half in 2006, to a low of 402 pounds of dried wild root reported for 2009. Other than 2006, the 2008 harvest year is the only other report of over a ton of dried wild harvest for this commodity.

Dried bloodroot root wild harvests fluctuated between about 1.7 and 3.2 tons for the 2005 – 2010 harvest years. Higher wild bloodroot root harvests were reported for 2000 – 2004, with a range of 5.7 to 24.3 tons recorded. Negligible cultivated root harvests were reported for all these years, never exceeding 50 pounds.

Blue cohosh root dried wild harvests reached a new high in 2010 at a reported 4.4 tons. Previous years' reported harvests ranged from about 2.0 to 4.0 tons for the 2000 – 2009 harvests. Cultivated dried harvests of blue cohosh root, while not reported for every harvest year, are usually about one hundred to two hundred pounds.

False unicorn root dried wild harvests have remained relatively stable from 2000 through 2010, varying from approximately 1.7 to 3.2 tons. False unicorn root dried cultivated harvests were reported at 700 pounds each for 2000 and 2001, double that to

1,400 pounds for 2002 and 2003, and level at just over 1,000 pounds for 2004 and 2005. Reports of cultivated harvests for this commodity dropped to under 100 pounds in 2006 through 2008, with no cultivated harvest reported for 2009 or 2010.

Reported wild harvests for lady's slipper root never exceeded 135 pounds for the 2000 – 2010 harvest years and were zero for three of those years. The reported cultivated dried harvest for this commodity reached a high of 286 pounds in 2003, with no cultivated dried harvests reported for the 2006 – 2010 harvest years.

The lomatium root reported dried wild-harvests (no cultivated dried harvests have yet been recorded) varied between 91 pounds and 816 pounds for the 2000 – 2009 harvest years, followed by a jump to about 2,700 reported dried pounds in 2010.

Usnea lichen dried wild-harvests have ranged from a reported high of 1,887 pounds in 2007 to a low of 567 pounds in 2010, with values also exceeding 1,000 pounds in the 2002, 2003, 2005, 2006, and 2008 harvest years. Cultivated dried harvests were reported of 25 or 30 pounds for each of the 2008 – 2010 years.

The reported dried wild-harvest of osha root for 1997 was over a ton, and this value rose to about six tons during 1998 – 1999 before settling to under a ton for the 2000 – 2004 harvest years. The 1997 – 1998 reported harvests for this and other commodities are available in earlier tonnage surveys. The osha dried wild-harvests ranged between 1,440 and 2,309 pounds for 2005 – 2009, and rose to a high of 2,852 pounds in 2010, which is well under the 1998 and 1999 six ton harvests. Cultivated harvest reports for this commodity were reported at a half-ton in 1998, a ton in 1999, and as 400 or fewer pounds for the other years where a cultivated harvest was reported. The 2006 – 2010 harvest years for cultivated osha reported only 25 or 35 pounds in 2009 and 2010.

Venus flytrap whole plant (new to the 2004 - 2005 survey) and sundew (since 2000) are yet to report a dried harvest of wild or cultivated plants.

Virginia snakeroot root reported wild harvests reached a high of 353 pounds in 2004, and with the exception of the 2000 and 2003 harvests (287 and 135 reported pounds, respectively), have been under 100 pounds for all other years. Cultivated harvests have not yet been reported for this commodity.

The reported wild yam root dried harvest continues to represent significant quantities of this herbal commodity, with about 30 tons reported harvested in 1997 – 1999, and in

2009. Interim harvest years saw reported harvests of between 12 and 17 tons, with the 2010 reported wild-harvest of wild yam tuber coming in at 21 tons. With regard to cultivated harvests, only 2001 showed a significant harvest of 5 tons, with other years reporting a cultivated harvest remaining well below 500 pounds.

Analysis of the Survey for FRESH Plant Material

Although some companies specialize in manufacturing with fresh ingredients, and some products are manufactured using material that has not been dehydrated, the greatest portion of herbal materials come into the market after drying. Not surprisingly, then, the harvest quantities of these plants in fresh form are significantly less than in dried form. However, significant fresh-weight harvests at never before recorded levels were seen for *E. purpurea* herb, with fresh cultivated harvest weights of 96, 289, and 409 tons, respectively, for the 2008, 2009, and 2010 harvest years. The fresh-weight harvest of wild osha root also showed an uptick in 2010 with just under a ton reported.

No fresh harvest was reported in any of the 2000 – 2010 harvest years for four of these commodities, namely cascara sagrada bark, lady's slipper root, sundew herb, and Virginia snakeroot root. Data for all of the other plants are recorded in Table 2.

Cultivation Data

Of the 26 commodities provided from 22 plant species that are discussed in this survey, only the four species identified above as reporting no fresh harvests also reported no harvests from cultivation efforts during some portion of years 2006 – 2010. The cultivated quantities of twelve of these commodities (aletris, bethroot, black cohosh, bloodroot, blue cohosh, false unicorn, lomatium, and osha roots; saw palmetto fruit, slippery elm inner bark, usnea lichen, and wild yam tuber) are insignificant either relative to reported wild harvests or in absolute amounts.

The reported saw palmetto fruit cultivated harvests ranged from about three quarters of a ton to two tons for the 2006 – 2010 harvest years, but this is insignificant relative to the reported wild-harvests of millions of pounds. The reported cultivated harvests for black cohosh root and rhizome represented less than 1% of the amounts reported for wild harvested materials for harvest years 2006 – 2009, rising to 3% of the total for 2010, a

percentage that was exceeded in 2005 with a reported 5% of the harvest due to cultivated materials. The other six cultivated species (*Arnica* spp., *Echinacea angustifolia*, *E. pallida*, *E. purpurea*, *Hydrastis canadensis*, and *Dionaea muscipula*) are plants for which the annual cultivated total represents a meaningful portion of the entire usage of these species. The already mentioned reported drop in false unicorn root dried cultivated harvests from about 1,000 pounds each of fresh and dried weights for 2004 – 2005, and comparable levels for years prior, to below 60 pounds afterwards is notable. Cultivation of goldenseal, also already mentioned, will be further discussed in the following section of this report.

The size of cultivated dried arnica herb harvests exceeded the size of wild-collected ones in each of the 2004 – 2010 harvest years except for 2006 and 2008. As previously reported, for the 2007 – 2010 harvest years this cultivated dried commodity registered between 400 and 800 pounds annually. In 2008, the wild harvest of over 1,500 pounds of this commodity exceeded the 377 pounds reported cultivated, and in 2006 the 85 pound reported cultivated harvest was dwarfed by the reported 1,025 pounds of dried arnica wild harvest.

The reported Venus flytrap plant harvests continue to be represented solely by cultivated efforts that produced fresh plant harvests of between 28 and 75 pounds fresh weight each harvest year from 2004, when this commodity was first tracked, through 2010. No cultivated lomatium root dried harvest has been recorded from 2000, when this commodity was first tracked, through 2010. However fresh root cultivated harvests have been reported from 36 to 166 pounds fresh weight in years 2000 – 2006, with none reported in 2007 – 2010.

Cultivated osha root reported dried harvests have been sporadic from as high at 2,000 pounds, reported in 1999, to 25 and 35 pounds in 2009 and 2010, respectively. No dried cultivated harvests of this commodity were reported for harvest years 2006 – 2008. Some fresh weight cultivated osha root harvest was reported during 2006 – 2010, with 40 pounds recorded for 2010.

No cultivated harvests were reported for lady's slipper for the 2006 – 2010 harvest years, though earlier harvests recorded dried cultivated root, with a high of 286 pounds reported in 2003.

The three remaining species for which cultivation data was provided are the *Echinacea* species. With regard to *Echinacea* spp. dried root crops, the *E. pallida* root cultivated harvest totaled 1.0 tons in 2008, and 1.3 and 0.5 tons in 2009 and 2010, respectively. No wild harvest was reported for the same period; however in 2006 – 2007 the primary source of *E. pallida* root was wild harvests of 0.6 and 1.1 tons respectively. The reported *E. purpurea* 2010 cultivated dried root harvest of 94.4 tons was a high surpassed only by the reported 137.7 tons in 2004, and a figure of 195.0 tons in 1999 and 169.5 tons in 1998, as can be seen in Chart 6. The reported cultivated harvests of dried *E. angustifolia* root ranged between 10.5 and 48.4 tons for the 2006 – 2010 years. Reported cultivated dried root harvest for years 1997 – 2005 fell within this range, with the exception of 52.4 tons reported in 1998 (from earlier surveys), and the highest value of 109.6 tons recorded for 1999. Chart 8 provides a graphical representation of the percent cultivated dried harvest for all three *Echinacea* species relative to the total reported dried harvest for each of the years 1997 – 2010.

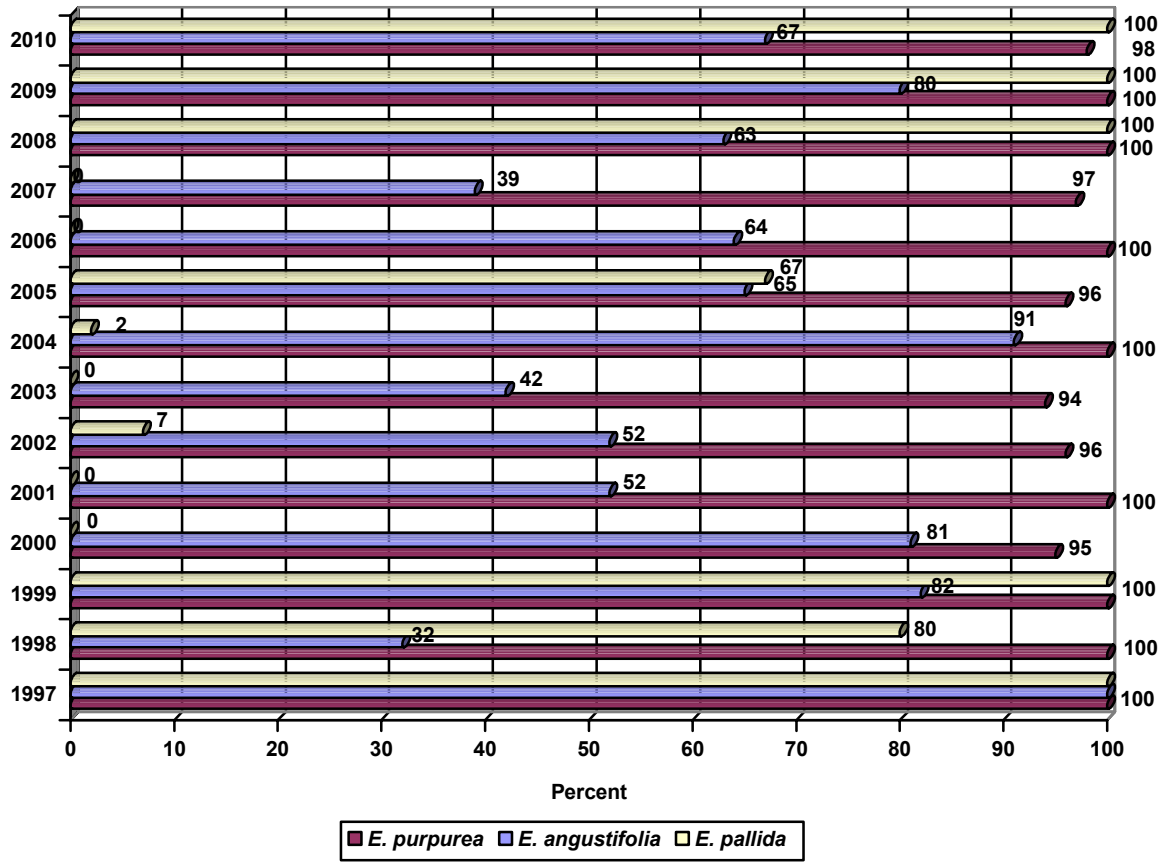
E. angustifolia reported cultivated fresh root harvests ranged between 0 tons and 4.3 tons for the 2006 – 2010 harvest years. 2000 was the peak year, with 16.4 reported fresh weight tons recorded (data from earlier surveys). No cultivated fresh root harvest of *E. pallida* was reported for 2006 – 2010, while *E. purpurea* cultivated fresh root harvests for the same time period were recorded as varying between 1.9 and 5.1 tons.

With regard to the demand for aerial materials (any/all above ground plant parts), the amount of the *E. purpurea* reported cultivated dried material came in at a low of 44.5 tons in 2008 and a high of 106.2 tons for the 2010 harvest year. While certainly substantial, this is well below the 1997 – 1999 peak year harvests of 544, 1,269, and 796 reported dried tons for those respective years (data included from earlier surveys).

E. purpurea cultivated fresh herb harvests were recorded at 100, 289, and 409 tons for respective harvest years of 2008 – 2010. This is far above all previous years, with the exception of 95 tons cultivated fresh weight reported for 2000. The fresh aerial herb harvest for the other two *Echinacea* species was recorded as zero for the entire period from 2006 to 2010.

CHART 8

Percent of Dried *Echinacea* spp. Root 1997 – 2010 Harvest from Cultivation



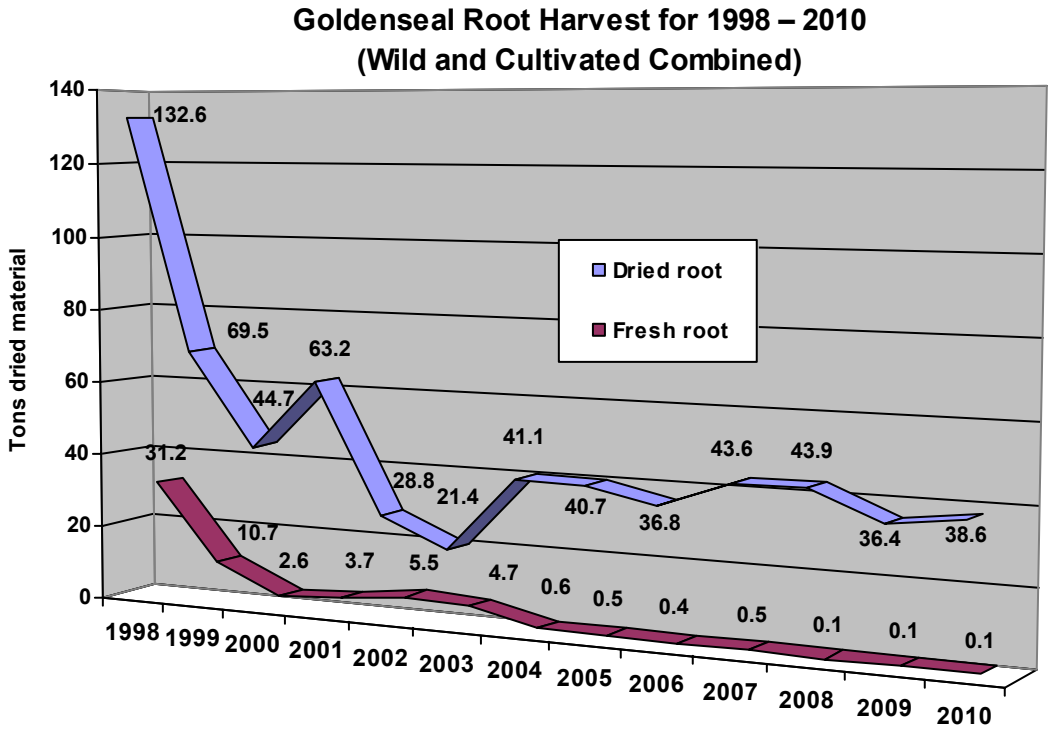
Goldenseal Root Harvest

Ten respondents identified themselves as primary producers of wild goldenseal root for the 2008 – 2010 harvest years, and eight for 2006 – 2007. The change for 2008 – 2010 relative to 2006 – 2007 was due to three new suppliers and the loss of one. Six respondents also identified themselves as primary producers in the 2004 – 2005 survey, one more than responded in the 2002 – 2003 survey, and the same number as the 2000 – 2001 survey. Four of the ten 2008 – 2010 suppliers of wild root also reported cultivated harvests and were joined by five others for a total of nine suppliers of dried cultivated goldenseal root for the 2008 – 2010 harvest years. Five of the eight 2006 – 2007 primary producers of wild goldenseal root also reported cultivated root harvests, as did eight other respondents (one more than the previous reported survey from 2004 – 2005).

Table 1 includes harvest data for dried goldenseal root from both wild and cultivated sources for the twelve years 1999 – 2010. Chart 9 shows a peak harvest of 133 tons of dried root from combined wild and cultivated sources recorded in 1998, with cultivated dried materials representing 2 percent of that total (see Chart 2). The reported combined dried harvest of this root and rhizome reached a low of 21 tons in 2003 before rebounding to between 36 and 44 tons for 2004 – 2010, and remained relatively stable for these seven years. A similar pattern can be seen for the reported wild root dried harvest in Chart 3 for these same years.

Chart 4 also shows a rebound for cultivated dried goldenseal root from a reported low of 5.5 dried tons in 2003 to a fluctuation between 6.2 and 16.9 dried tons for years 2004 – 2006, and leveling off to a reported 8.3 to 9.2 tons cultivated dried root for the 2007 – 2010 harvest years.

CHART 9



Conclusions and Future Surveys

Tonnage Surveys of Select North American Wild-harvested Plants, 2006-2010, prepared by the American Herbal Products Association, provides the quantitative usage data

gathered by the American herb industry for 26 botanical commodities for the five harvest years of 2006 – 2010, and includes results from previous years' surveys. The respondents provided information on both wild-harvested and cultivated quantities for each of these commodities.

Annual variations in harvest quantities for certain of these commodities are consistent with market factors over the past several years. This review of data over the fourteen-year period reveals that patterns in market demand are reflected in annual variations of harvests of both wild and cultivated sources of these botanical commodities. Several species for which there are large market demands are cultivated to a sufficient degree so that some meaningful portion of the total usage is provided by farmers rather than by harvesters of wild plants. The most recent surveys affirm that this continues to be the case for the goldenseal market. Additionally, the few pounds reported from Venus flytrap harvests, all fresh, were all cultivated. Most *Echinacea* spp. have a considerable portion of their harvest arising from cultivation, as does arnica. However, other commodities are only marginally cultivated or not cultivated at all, including false unicorn root, which showed only marginal cultivation in the 2006 – 2010 harvest years compared to prior surveys going back to 2000, when it was first tracked.

AHPA has not attempted in this report to evaluate extensively the relationship between market demand for each of these herbs and the relative scarcity or abundance of any of these plants. However, market demand, not plant availability, seems to be the primary driver of total harvest quantities. As has been noted in other publications, information about the population dynamics of many of these species in their native habitats is not well understood.

AHPA intends to continue biannual surveys for at least the immediate future, with the next two-year survey to cover the 2011 and 2012 harvest seasons. The focus remains on North American wild plants, and although some consideration was given to removing low-volume commodities from the survey, AHPA has decided to keep these commodities as part of the survey. AHPA will continue to work to identify and involve more primary raw material producers. Additional commodities may also be added, based on communication with suppliers, while conducting the 2011 and 2012 survey.