ANALYSIS OF TRADE IN PARTS AND DERIVATIVES OF *HYDRASTIS CANADENSIS* FROM CANADA AND THE US

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1. Introduction

Hydrastis canadensis, commonly known as goldenseal, is a herbaceous plant that is harvested from the wild in Canada and the USA for a wide range of medicinal uses. The species has been listed on Appendix II of CITES since 1997 with the annotation #3 which specifies:

> Annotation #3: Designates whole and sliced roots and parts of roots, excluding manufactured parts or derivatives such as powders, pills, extracts, tonics, teas and confectionery.

This paper analyses the parts and derivatives of the species which are currently in trade as a contribution to the CITES Project S-231 undertaken by the IUCN/SSC Medicinal Plant Specialist Group. The main objectives of the study are to:

- Confirm which parts/derivatives/commodities enter international trade
- Identify the main purpose and use of these
- Review the current trade volume and estimate the relative proportion in trade of the different parts/derivatives/products

The activities undertaken as part of the study included a literature survey, internet search, analysis of the CITES trade data, review of Customs data and correspondence with traders and other experts. The people contacted as part of the study are listed in Annex 1.

2. Utilisation

Hydrastis canadensis has been collected as a medicinal plant for hundreds of years. Historically the plant was used by Native North Americans as a yellow dye and as a treatment for a variety of ailments ranging from cancer to arrow wounds (Robbins, 1999). Amongst Northern American tribes, goldenseal is now mainly used by the Cherokee and Iroquois (Upton, 2001). European settlers in the 18th century used a goldenseal root wash for eye inflammations and goldenseal was a common ingredient of patent medicines in the late 19th century (Madis Botanicals, 1997). With the introduction of antibiotics, US domestic use of goldenseal declined but it remained a valuable commodity in Europe. Over the past 20 years, with resumed interest in herbal medicines, golden seal has regained popularity in the US. It is now one of the most popular medicinal plants used in North America and remains a staple of most herbal practitioners (Upton, 2001). Current uses include treatment for digestive disorders, peptic ulcers, gum diseases, sinusitis, catarrhal deafness, tinnitus, pelvic inflammatory disorders and menstrual complaints. Goldenseal is applied externally for vaginal infection, eczema and conjunctivitis (WWF, 2002). According to Duke, 1997, goldenseal was sought after as a means to mask illicit drugs in urinalysis, although widespread claims that this was effective were untrue.

The primary constituents of goldenseal that are of medicinal interest are the alkaloids berberine, canadine and hydrastine. Goldenseal products available in trade include cut and powdered root, tincture, fluid extract, powdered extract, tea and a wide variety of processed pharmaceutical remedies in the form of capsules, tablets, salves and other products. It is used in a range of multi-ingredient products.

Definitions of Goldenseal

Goldenseal consists of the dried roots and rhizomes of *Hydrastis canadensis.* It contains not less than 2 percent of hydrastine and not less than 2.5 percent of berberine calculated on the dried basis.

Powdered goldenseal is goldenseal reduced to a fine or very fine powder.

Powdered goldenseal extract is prepared from the pulverised dried roots and rhizomes of *Hydrastis canadensis* using suitable solvents. It contains not less than 5 percent of hydrastine and not less than 10 percent of total alkaloids. The ratio of starting crude plant material to powdered extract is 2:1.

Source: The United States Pharmacopeial Convention, 2003

3. Primary production and harvesting

Table 1 shows the production of goldenseal root in the US based on a survey carried out by the American Herbal Products Association (American Herbal Products Association, 2003). Most of the material produced continues to be sourced from the wild, with goldenseal roots bringing the same price regardless of production method. In response to declining wild populations, experimental cultivation of goldenseal first began around 1899 (Upton, 2001). With increasing demand for the medicinal plant once more cultivation is again expanding (Upton, 2001). Commercial cultivation takes place in both the US and Canada with propagation either by rhizome division or from seed.

In addition to the roots, which are the main source of medicinal products, leaves and stems also have commercial value (University of Kentucky, 2004). Leaves and stems, ground up with the root when it is traded as powder are considered an adulterant (Upton, 2001). Leaves have been used in small quantities within diet blends (De Angelis, *in litt*. 2004).

Table 1: Annual production of goldenseal root in the US (metric tonnes)

Dried goldenseal root	**1998**	**1999**	**2000**	**2001**
wild	131.5	46.4	35.8	53.3
cultivated	3.3	24.2	9.7	10.9
TOTAL	134.8	70.6	45.5	64.2
Fresh goldenseal root				
wild	24.7	7	2	2.8
cultivated	7	3.9	0.6	1
TOTAL	31.7	10.9	2.6	3.8

4. International Trade

A significant amount of goldenseal is exported from the US and Canada, but the relative importance of domestic and international trade in goldenseal is unclear. According to a paper cited in Robbins, 1999, "as recently as 1993, European markets for *H. canadensis* may have been 20 times that in the US." Robbins, 1997 points out the 600 percent increase in trade during the 1990s, noting that the bulk is used internally with only 10 percent exported. The US Federal Register in April 2002 notes that, *It is estimated that tens of millions of goldenseal individuals are harvested from the wild each year for the herbal products industry. However only a small fraction of this total is recorded in international trade*. A recent estimate suggests that about 60 percent of the US domestic production is used within the country with the remainder exported (De Angelis, *in litt*. 2004).

According to Bannerman, 1997, citing FAO as the source of information, goldenseal is one of the best selling herbs internationally and it is marketed in over 500 medicinal products worldwide. It is recorded in the official pharmacopeias of nine countries (Madis Botanicals, 1997). Goldenseal is a component of at least 300 homeopathic remedies produced in France, Germany, UK, Switzerland, Spain and Australia. Italy is a major producer and exporter of goldenseal products and France exports tinctures, dilutions and

finished products (Bannerman, 1997). The Nutritional Outlook Buyers Guide lists two companies dealing in goldenseal in China, one in the UK, one in Canada and 74 in the US.

Goldenseal retails for well over $220 per kg, making it one of the most expensive herbs on the market (WWF, 2002).

Table 2 below shows the exports of *H. canadensis* from Canada and the US as recorded in the UNEP-WCMC CITES Trade Database and Table 3 provides additional Canadian export information for 2003.

Table 2: Exports of Goldenseal from Canada and the USA, 1998-2002, as recorded in the UNEP-WCMC CITES Trade Database

Export from Canada					
Country of import	**Year**				
	1998	**1999**	**2000**	**2001**	**2002**
Australia		40g roots* 360 (1060) kg roots	50 kg roots* 20g roots*	500 (520)g roots 200 (313) kg roots	
France				500 g roots 1 kg roots	200 kg roots*
Germany					200 kg roots*
Italy				500 g roots	
US		5 live* 200 roots*	227 kg dried plants* 10g roots* 975 kg roots*	454 g roots 3855 (2807) kg roots	1362 kg roots*
Export from US					
Country of import	**Year**				
	1998	**1999**	**2000**	**2001**	**2002**
Australia	274 kg roots 773 (273) kg roots 803 kg* roots			254 (240) kg roots	772 kg roots
Austria				1 kg roots	
Belgium	35 kg roots				
Canada		25120 live* 120 (25000) roots			
Chile					10 kg roots
China			295 kg roots 143 kg roots		
France	611 kg roots	130 (31) kg roots	1278 kg roots	300 kg roots	272 kg roots
Italy	4534 kg dried plants* 4570 kg roots			1 kg roots	38 kg roots
Germany	28g* roots 3992 (3991) kg roots		100 kg roots* 120 kg roots*		60 kg dried plants* 80 kg roots 60 kg roots 210 kg roots*
Spain	25 kg live*				
UK		100 roots			

Notes:
1. The distinction between wild and artificially propagated material is not noted in the above table.
2. The quantities are as reported by the exporting country except where marked * which signifies that the quantities are reported by the importing country or where a different value is reported by the importing country and is given in brackets.

Table 3: Canadian exports of Goldenseal roots by individual permit in 2003

Country of destination	Quantity [kg]
France	50.000
US	0.250
US	58.970
US	14.060
US	45.360
US	22.680
US	68.040
UK	22.680
US	45.360
Not given	1,025.000
CH	50.000
US	258.100
DU	318.000
Not given	189.600 *
TOTAL	2,1680.10

Notes:
1. This information was provided by Ribeyron, *in litt* 2004
2. All the material is recorded as artificially propagated
3. * no unit of measurement is given for this quantity

The extent to which the CITES trade data reflect the total volume of *Hydrastis canadensis* in international trade is unclear. Customs data were consulted for comparison but are not broken down into species level information. The relevant commodity code is 121190: *Plants & parts of plants (including seeds and fruits) used primarily in perfumery, pharmacy or for insecticides etc. fresh or dried.*

According to Bannerman, 1997, one estimate (by Agros Associates) of the annual volume of goldenseal entering the UK was approximately 10 tonnes with an estimated value of US $1.55 million. One UK company contacted during this study reported importing *Hydrastis* for about 15 years as whole root, cut root and powder, currently purchased from one source in Canada and one in the US. Annual imports by this company are approximately 0.25 tonnes.

4. Analysis and discussion

The majority of goldenseal material reported in international trade, according to CITES trade data, is "roots". This reflects the plant parts for which CITES licensing and reporting is required based on the annotation for the species. As pointed out in a US Fish and Wildlife Service information document, "Finished products such as capsules, powders and tinctures that contain goldenseal are not regulated under CITES and do not require CITES documents" (US Fish and Wildlife Service, 1999). In addition to the term "roots", other terms that have been used in CITES reporting of *Hydrastis canadensis* are derivatives and/or medicine; dried plants; extract; and live plants (Caldwell, pers comm.).

In addition to whole, sliced and dried roots, powdered root is also in international trade but it is currently difficult to ascertain either the quantity or the relative proportion of goldenseal that is traded in this form as there is no mechanism for monitoring or data collection. Based on information provided by a US trader it is thought that the primary forms in trade (in order of quantity) are powder, dry root, fresh root, live plants, leaves, seeds and fruit (De Angelis, in litt. 2004). Fresh root is used primarily as planting stock for cultivation purposes. It has been suggested by several correspondents that goldenseal may on occasion be deliberately powdered prior to export to avoid CITES paperwork (even when the traders have documents to show legal acquisition). It is also currently difficult to ascertain how much international trade there is in finished or manufactured products. A more extensive survey of traders may yield information on trade in semi-processed and processed goldenseal.

In 2002, there was a request from traders within the US that goldenseal be removed from the CITES Appendices. This was not submitted by the US Government because of continuing declines in wild populations and reported poaching throughout the range of the species (Anon, 2002). Accepting that there is a continued need for the listing it may be appropriate to modify the annotation to include powdered root as this appears to be a significant product in international trade as well as a commodity that first appears in international trade as an export from range states.

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Personal communications

John Caldwell, personal communication to Sara Oldfield, October 2004

Patricia De Angelis, email to Sara Oldfield, December 2004

Marie-José Ribeyron, email to Sara Oldfield, November 2004

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