U.S. Fish and Wildlife Service
Division of Scientific Authority
Convention on International Trade in Endangered Species of Wild Fauna and Flora
Record of Advice on Certificate of Artificial Propagation

Application number: [redacted] Date DSA: 09/17/2021

Applicant: [redacted]

Specimens: Artificially propagated goldenseal (*Hydrastis canadensis*) dried roots, rootlets, rhizomes, or part of roots in whole, cut, or powdered form, not to exceed 487lbs (221kg) dry weight

Type of permit: Certificate of Artificial Propagation

ADVICE
We find that the above specimens, as described in this application, qualify as "artificially propagated" according to the criteria of CITES Resolution Conf. 11.11 (Rev. CoP18).

Basis for advice:

1. The applicant, [redacted] has requested to establish a Master File to export artificially propagated dried roots, rootlets, rhizomes, or part of roots in whole, cut, or powdered form of *Hydrastis canadensis,* commonly known as goldenseal. The application was submitted on August 10, 2021 and supplementary information was provided to DMA on September 9 and 17.

2. According to Resolution Conf. 12.11 (Rev. CoP18) (Standard nomenclature), species that are listed in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) should have a valid CITES-recognized name, as reported in CITES-approved checklists. Nomenclature for the species follows the Checklist of CITES Species (UNEP-WCMC 2021).

Life Cycle & Conservation Status

3. Native to 26 U.S. States and to Ontario, Canada, goldenseal is a slow-growing perennial herb of the Appalachian and Ozark woodlands understory (NatureServe 2012; Van der Voort, et al. 2003). Despite its wide range, goldenseal is patchy in distribution and rarely to infrequently located, even across extensive areas of suitable habitat (Thatcher, et al. 2006; Sanders & McGraw 2002). Goldenseal requires four to seven years to reach sexual maturity, producing a single flower that, in late summer or early fall, may produce a single, berry-like fruit with 10-30 seeds. "Germination from seed is slow, erratic, and unpredictable."[1] Seeds require one to two winters before germinating, and germination "can range from 0 to 90% the first spring after seed harvest" (Davis & Mccoy 2000). Wild or cultivated, few seeds produce seedlings, and few seedlings survive. Goldenseal is slow-growing and spreads primarily through clonal propagation, via underground rhizomes, contributing to the plant's patchy appearance in the wild.[2]

[1] Page 3, Davis 2013.
[2] Summarized from research undertaken in the years since goldenseal was included in CITES Appendix II, including: Burkhart &

4. Goldenseal has been assessed as Vulnerable according to the International Union for the Conservation of Nature (IUCN) Red List criteria (Oliver 2017). Threats to goldenseal include habitat destruction, invasive species, deer overpopulation, in addition to excessive wild harvest or illegal collection (NatureServe 2012; Oliver 2017). This monotypic genus exhibits life history traits that limit its expansion, dispersal, and regeneration, and increase its vulnerability to overharvest, such as a reliance on clonal reproduction; poor regeneration and survival; and patchy, sparse, and isolated occurrences. Species with these traits may be generally more vulnerable to overharvesting[3]. The USFWS considers monotypic genera to be at higher conservation risk because the species represents "highly distinctive or isolated gene pools…,"[4] and so confers a conservation category of higher concern to monotypic genera.[5]

5. Wild collection is illegal in Canada (Environment and Climate Change Canada 2018). In the United States, wild collection is illegal in some States, but not all. In July 2021, DSA reviewed State legislation throughout its U.S. range to confirm or update goldenseal's status. Currently, goldenseal is State listed as endangered, vulnerable, or threatened in eleven states, and a species of special concern in 4 states. Note that both Oregon (where the applicant is located) and Washington (where the applicant's specimens and founder stock were grown) are outside the natural range of goldenseal.

Commercial Demand and U.S. Production

6. Goldenseal is the most valuable and high-volume CITES-listed U.S. root crop *after* American ginseng (Chamberlain, et al. 2018). In 2020, U.S. sales of goldenseal combined with Echinacea[6] ranked 12th out of the 40 top-selling herbal supplements, up from 17th in 2019 (Smith, et al. 2020, 2021). However, with an estimated value of $2.3 million annually (Kruger, et al. 2020), goldenseal's market value is an *order of magnitude less* than the $27 million estimated annual value of wild American ginseng (Chamberlain, et al. 2018). The market price for goldenseal can be erratic and despite occasional price spikes, the market price for cultivated material is generally insufficient to cover the costs of entering into cultivation—a multi-year land-use commitment, with upfront costs for planting stock that may be difficult to obtain, expenses for weed and crop pest control, uncertainties associated with variations in yield and unstable market prices, potential for catastrophic crop loss, and risks associated with poachers.[7]

7. There are no known statewide or national mechanisms that report the volume of goldenseal harvested from wild or cultivated sources in the United States, but available information shows a sustained, high demand for wild goldenseal. According to periodic reports produced since 1999 by the American Herbal Products Association (AHPA), the primary source of dried goldenseal root entering the U.S. market since 1999 has been from wild-harvested sources (AHPA 1999, 2000, 2003, 2006, 2007, 2012, 2020). However, commercial exports

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Jacobson 2006; Christensen & Gorchov 2010; Davis 2013; Davis & McCoy 2000; Davis & Persons 2014; FNA 2007; Jones & Szymanski 2003; Jones & Wright 2011; Lockard & Swanson 1998; McGraw, et al. 2003; NatureServe 2012; Pengelly 2012; Sanders 2004; Sanders & McGraw 2002; Sinclair and Catling 2000, 2002; Stoltz 1994; Thatcher, et al. 2006; Van der Voort, et al. 2003.

[3] Derived from multiple sources: Burkhart & Jacobson 2006; Chen, et al. 2016; Christensen & Gorchov 2010; Davis & McCoy 2000; McGraw, et al. 2003; Sanders 2004; Sinclair and Catling 2000, 2002; Van der Voort, et al. 2003.

[4] 48 FR 43098; September 21, 1983.

[5] USFWS website: https://ecos.fws.gov/ecp/report/table/candidate-species.html

[6] Goldenseal is most commonly sold in combination with Echinacea (*Echinacea* spp.).

[7] Information summarized from DSA files, including the following publications: AHPA 2020; Beyfuss 1998; Burkhart & Jacobson 2006, 2008; Burrell 2006; Chittum, et al. 2019; Davis 2013; Jacobson & Burkhart 2011.

since 2003 have been limited to artificially propagated material. Goldenseal can be grown from seeds, rhizome cuttings, fibrous root cuttings, or 1- to 2-year-old transplants; these methods differ in reliability and the timeframe needed to obtain a marketable crop (with seeds being the least reliable and the longest crop cycle).[8]

8. Following its 1997 listing in CITES Appendix II, a few commercial operations have been established to produce cultivated goldenseal. Over time, our office has become aware of only a small number of documented U.S. goldenseal growers whose material has qualified as artificially propagated. Recently, at least two longtime goldenseal growers or businesses employing these growers began closing their operations, decreasing the availability cultivated material. This is borne out by AHPA's latest survey of raw materials producers, covering the years 2011-2017, in which the proportion of cultivated material decreased 6% as compared to 2005-2010 (AHPA 2012, 2020). The same survey showed a significant increase in wild-harvested *fresh-weight* goldenseal rhizome in 2014-2017, and at rates higher than any previously reported since 1998 (AHPA 2020).

Analysis of the specimens to be exported

9. After review of this application, we find that the specimens intended for export, as described in this application, qualify as "artificially propagated" according to the criteria of CITES Resolution Conf. 11.11 (Rev. CoP18) as follows:

   a. **grown under controlled conditions, i.e., in a non-natural environment that is intensively manipulated by human intervention for the purpose of plant production; and**

   Finding: [redacted] has been in business since 2014 in the general herb trade (website: [redacted]). The applicant maintains a single growing location in [redacted]. The applicant began growing goldenseal in 2021 and plans to export goldenseal as dried roots, rootlets, rhizomes, or part of roots in whole, cut, or powdered form. The founder stock was purchased from [redacted] and all exports will be derived from material cultivated on their farm, but that crop is not yet ready for harvest.

   The applicant also purchased 487 pounds of dehydrated 4-year-old goldenseal root from [redacted] on 7/28/2021 ready for resale and export. These are the specimens are being requested for export this year under the present application.

   [redacted] is a well-known grower of cultivated goldenseal who has both held a CITES permit for export of artificially propagated rhizomes (most recently, [redacted] in 2019), and has supplied goldenseal to other exporters which DSA has determined to be artificially propagated. Established in 1998, [redacted] maintained a 55-acre farm that was certified organic for producing medicinal herbs. Ten acres of goldenseal was grown in prepared beds under artificial shade cloth, capable of producing approximately 600 pounds of plants annually after the fourth growing season in the fall.

   Thus, we conclude that the 487 pounds of dehydrated goldenseal specimens were produced in a cultivated setting that was intensively managed for the purpose of plant production.

[8] Based on multiple sources: Davis & McCoy 2000; Davis and Persons 2014; Jones & Wright 2011; Stoltz 1994.

b. **grown from seeds, cuttings, divisions, callus tissues or other plant tissues, spores or other propagules that either are exempt or have been derived from cultivated parental stock, and the cultivated parental stock used for artificial propagation is, to the satisfaction of the designated CITES authorities of the exporting country:**

i. established in accordance with the provisions of CITES and relevant national laws and in a manner not detrimental to the survival of the species in the wild; and

ii. maintained in sufficient quantities for propagation so as to minimize or eliminate the need for augmentation from the wild, with such augmentation occurring only as an exception and limited to the amount necessary to maintain the vigor and productivity of the cultivated parental stock.

Finding: As noted above (paragraph 10.a), [redacted] is an established grower of artificially propagated goldenseal. Their founder stock was obtained in 2002 as cultivated plants from [redacted] ginseng was an established goldenseal grower since 1998 and is no longer in business.

[redacted] maintained its parental stock by dividing and replanting rootlets and rhizomes in its fields. The rhizomes were dug up and divided with part of the rhizomes replanted in the field and the rest prepared for sale. In this way, the grower maintained its parental stock by this closed production system since 2002.

A signed statement from [redacted] dated July 28, 2021, was included in the application indicating the dried roots and all remaining goldenseal growing stock were sold to [redacted] on August 7, 2021.

10. Based on the information provided, we find that the 487 pounds (221 kilograms) of dehydrated goldenseal meet the criteria for 'artificially propagated' plants.

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