

**Hydrastis canadensis L.**

783

Ranunculaceae

**Nomenclatural reference** 1208 RBG Kew (2021): World Checklist of Vascular Plants (WCVP). - Download wcvp\_v6\_sep\_2021, last modified 2021-09-15. Retrieved from <http://sftp.kew.org/pub/data-repositories/WCVP/>, viewed 15.10.2021.

**Summary**

Distribution	Hydrastis canadensis is native to large parts of eastern North America. Its native range reaches from southeastern Canada to north-central and eastern United States. It is most abundant in Ohio, Illinois, Indiana, and eastern Kentucky.
Legislation	The species is listed in CITES Appendix II.
Threat Category	Goldenseal has been assessed globally by IUCN as Vulnerable. Assessed nationally as Vulnerable (N3/N4) in the United States. Downlisted from Threatened to Special Concern in Canada in 2019.
Threat	The most important threats to wild populations are habitat loss and degradation. Unsustainable harvesting for use in the phytomedicinal industry is also a threat, facilitated by the slow growth and regeneration/reproduction of the species. Deer browsing is a further threat.
Abundance	Hydrastis canadensis has become rare in the wild and remaining populations are rather small and isolated with clumped individuals, due to the reproductive biology of the species.
Habitat	Understorey plant of nutrient-rich, mesic to moist deciduous woodlands in elevations from 50 to 1200 m asl.
Regeneration	Hydrastis canadensis primarily propagates vegetatively from its rhizomes and can form large patches of clones. If carefully harvested, populations may regenerate from remaining rhizome parts. It takes five to seven years for seed-grown plants to produce harvestable rhizomes.
Reproduction	The single flowers are first built in the third or fourth year. The species is monoecious and self-compatible and flowers are pollinated by unspecific generalist pollinator insects (small bees and flies). Main dispersers of the fruits probably are birds; however, fruit and seed set is regarded low and dispersal via seeds is rather uncertain and ineffective, as germination rate is low and seedlings are rarely found in nature.
Lifeform	Hydrastis canadensis is a long-lived perennial herb, with shoots of 20 - 50 cm height and one to three leaves. It dies back in autumn and resprouts from the rhizome in spring,
Plant Parts	Harvested parts are the rhizomes and roots.
Use	Goldenseal was traditionally used by Native Americans as a coloring agent and as a remedy for common diseases and conditions such as wounds, digestive disorders, ulcers skin and eye ailments, and cancer. Its current medicinal use is mainly to treat digestive complaints and for various diseases and disorders affecting the mucous membranes. It is known as a synergistic herb that increases the effect of other herbs when taken together. It contains the bioactive alkaloid berberine, which has numerous therapeutic effects.
Use Fields	Animal poison; environmental use (horticulture); medicine;
Trade Trend	Demand for goldenseal has increased over time, as applications have expanded beyond traditional and local uses and interest has been renewed in herbal medicines in North America and internationally. Although nearly all material in trade continued to come from wild collection until the early 2000s, there has been a shift in the international market to cultivated sources in recent years. CITES Trade Database (2000-2016) indicates that the majority of material in international trade is now from artificially propagated plants.
Systematics	The genus Hydrastis has only one species: Hydrastis canadensis.

**Taxonomie and Identification**

**Taxonomy**

**Reference**

genus: "1 C & E N Am.: H. canadensis L. (golden seal, yellow or turmeric r.)"	3753 Mabblerley, D.J. (2017): The plant-book. 4th ed
"Hydrastis is sometimes placed in its own family, Hydrastidaceae, with one other monotypic genus, Glaucidium, which is restricted to Japan [...]. However, under the Angiosperm Phylogeny scheme, they are placed under Ranunculaceae."	3594 Oliver, L. (2017): Hydrastis canadensis. The I

**Synonyms**

## Name Used in Pharmacopoeias and other References

Name as used in Source	Status	Reference
<i>Hydrastis canadensis</i>	1199	Brinckmann, J., Kathe, W., Berhoudt, K. & Schippmann, U. (2020): Detailed analysis of global commercial cultivation of medicinal and aromatic plants (MAP). Unpublished project report for BfN. 36 pp. Bonn.
<i>Hydrastis canadensis</i>	3751	van Wyk, B.-E. & Wink, M. (2017): Medicinal plants of the world. 2nd edition. CABI, Wallingford & Boston.
<i>Hydrastis canadensis</i>	5641	Lange, D. (1998): Europe's medicinal and aromatic plants. Their use, trade and conservation. Traffic International, Cambridge.
<i>Hydrastis canadensis</i>	8394	Therapeutic Goods Administration (ed.) (2007): Substances that may be used in listed medicines in Australia. Therapeutic Goods Administration, Symonston. Retrieved from <a href="http://www.tga.gov.au/cm/listsubs.pdf">http://www.tga.gov.au/cm/listsubs.pdf</a> , viewed: 25.01.2009.
<i>Hydrastis canadensis</i> L.	1180	GRIN (17.3.2015): Download World Economic Plants report from GRIN Taxonomy for the query. Medizin = 'Alle Nutzungen'. Retrieved from <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxecon.pl?language=de">http://www.ars-grin.gov/cgi-bin/npgs/html/taxecon.pl?language=de</a>
<i>Hydrastis canadensis</i> L.	1199	Brinckmann, J., Kathe, W., Berhoudt, K. & Schippmann, U. (2020): Detailed analysis of global commercial cultivation of medicinal and aromatic plants (MAP). Unpublished project report for BfN. 36 pp. Bonn.
<i>Hydrastis canadensis</i> L.	2302	Native American Ethnobotany Database - <a href="http://naeb.brit.org/">http://naeb.brit.org/</a>
<i>Hydrastis canadensis</i> L.	5473	Moerman, D.E. (1998): Native American ethnobotany. Timber Press, Portland.
<i>Hydrastis canadensis</i> L.	5525	Penso, G. & Proserpio, G. (1997): Index plantarum medicinalium totius mundi eorumque synonymorum. 2nd edition. OEMF, Milano.
<i>Hydrastis canadensis</i> L.	6369	McGuffin, M., Kartesz, J.T., Leung, A.Y. & Tucker, A.O. (2000): Herbs of commerce. 2nd edition. AHPA, Silver Spring, USA.
<i>Hydrastis canadensis</i> L.	7279	van Wyk, B.-E. & Wink, M. (2004): Medicinal plants of the world. Timber Press, Portland.
<i>Hydrastis canadensis</i> L.	8300	Anon. (2007): WHO monographs on selected medicinal plants 3. WHO, Geneva.
<i>Hydrastis canadensis</i> L.	8375	Medicines and Healthcare Products Regulatory Agency (2008): British Pharmacopoeia 2009. 4 volumes. Stationery Office, London.
<i>Hydrastis canadensis</i> L.	8379	United States Pharmacopeial Convention (ed.) (2008): The United States Pharmacopeia USP 32. The national formulary NF 27. 2009. 3 volumes. United States Pharmacopeial Convention, Rockwell, MD.
<i>Hydrastis canadensis</i> L.	8380	European Directorate for the Quality of Medicines & Health Care (EDQM) (ed.) (2007-2009): European Pharmacopoeia. 6th edition. 2 volumes and 8 supplements. Council of Europe, Strasbourg.
<i>Hydrastis canadensis</i> L.	8418	Brandão, M.G.L., Cosenza, G.P., Assis Moreira, R. & Monte-Mor, R.L.M. (2006): Medicinal plants and other botanical products from the Brazilian Official Pharmacopoeia. Revista Brasileira de Farmacognosia 16 (3): 408-420.
<i>Hydrastis canadensis</i> L.	8450	Homoeopathic Pharmacopoeia of the United States (s.dat.): HPUS Online Database. Retrieved from <a href="http://www.hpus.com">http://www.hpus.com</a> , viewed: 26.10.2009.
<i>Hydrastis canadensis</i> L.	8865	ANVISA (2010): Farmacopeia Brasileira. 5th edition. 2 vols. Agência Nacional de Vigilância Sanitária, Brasília.
<i>Hydrastis canadensis</i> L.	8875	European Directorate for the Quality of Medicines & Health Care (EDQM) (2012): European Pharmacopoeia. Pharmacopée Européenne. 7.8 edition. USB stick version. Council of Europe, Strasbourg.
<i>Hydrastis canadensis</i> L.	8876	United States Pharmacopeial Convention (2013): The United States Pharmacopeia USP 37. The National Formulary 32. 2014. United States Pharmacopeial Convention, Rockwell, MD.

## Common Names

Common Name	Typ	Language	Country	Ref
blodstilla	?		1180	GRIN (17.3.2015): Download World Econo
Blutkraut	ver	German	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
Blutkrautwurzeln	ver	German	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Canadese Geelwortel	ver	Dutch	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
Eye balm	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
eyebalm	ver	English	4754	Unites States of America (1997): CITES Pr
eyeroort	ver	English	4754	
eye-root	ver	English	2032	Mansfeld, R. (1986): Verzeichnis landwirts
Eye-root	ver	English	4091	Catling, P.M. & Small, E. (1994): Poorly kn

fard inolien	ver		1180	GRIN (17.3.2015): Download World Econo
fard inolien	ver	French	5797	Wiersema, J.H. & Leon, B. (1999): World
golden seal	ver	English	2032	Mansfeld, R. (1986): Verzeichnis landwirts
Golden Seal	ver	English	4754	Unites States of America (1997): CITES Pr
Golden Seal	ver	English	6637	Erhardt, W., Götz, E., Bödeker, N. & Seyb
Golden Seal	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Golden Seal	ver	English	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
Golden Seal root	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
goldenroot	ver	English	4754	Unites States of America (1997): CITES Pr
Golden-Root	ver	English	5252	Coffey, T. (1993): The history and folklore
goldenseal	scn		6369	McGuffin, M., Kartesz, J.T., Leung, A.Y. &
goldenseal	ver	English	5797	Wiersema, J.H. & Leon, B. (1999): World
goldenseal	scn	English	6369	McGuffin, M., Kartesz, J.T., Leung, A.Y. &
goldenseal	ver	English	1180	GRIN (17.3.2015): Download World Econo
goldenseal	tra	English	4754	Unites States of America (1997): CITES Pr
Goldsiegel	ver	German	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
Goldsiegelwurzel	pha	German	4754	Unites States of America (1997): CITES Pr
Goldsiegelwurzel	ver	German	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
ground raspberry	ver	English	4754	Unites States of America (1997): CITES Pr
Ground Raspberry	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Ground Raspberry	ver	English	4091	Catling, P.M. & Small, E. (1994): Poorly kn
H (canadensis)	pha	Latin	4754	Unites States of America (1997): CITES Pr
Herba Hydrastis canadensis	pha	Latin	4754	
hidrastis	ver		1180	GRIN (17.3.2015): Download World Econo
hidrastis	ver	Spanish; Castilian	5797	Wiersema, J.H. & Leon, B. (1999): World
Hidrastis	ver	Turkish	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
hydraste	ver	French	4754	Unites States of America (1997): CITES Pr
Hydraste canadien	ver	French	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
Hydrastis	hom	Latin	2402	Bundesministerium für Gesundheit und So
Hydrastis canadensis	hom	Latin	2402	
hydrastis du Canada	ver	French	5797	Wiersema, J.H. & Leon, B. (1999): World
hydrastis du Canada	ver	French	1180	GRIN (17.3.2015): Download World Econo
Hydrastis Kanadsky	ver	Russian	4754	Unites States of America (1997): CITES Pr
Hydrastisrhizom	pha	Latin	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Hydrastisroot	ver	English	2056	
Idraste	ver	Italian	2056	
Idraste	ver	Italian	4754	Unites States of America (1997): CITES Pr
Indian dye	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Indian dye	ver	English	4754	Unites States of America (1997): CITES Pr
Indian dye	ver	English	2032	Mansfeld, R. (1986): Verzeichnis landwirts
Indian paint	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Indian paint	ver	English	4754	Unites States of America (1997): CITES Pr
Indian Turmeric	ver	English	6637	Erhardt, W., Götz, E., Bödeker, N. & Seyb
Indian turmeric	ver	English	4754	Unites States of America (1997): CITES Pr
Indian Turmeric	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
jaundiceroot	ver	English	4754	Unites States of America (1997): CITES Pr
Kanadische Gelbwurz	ver	German	4754	
Kanadische Gelbwurz	ver	German	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Kanadische Gelbwurzel	ver	German	2056	
Kanadische Gelbwurzel	ver	German	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
Kanadische Orangewurz	ver	German	2032	Mansfeld, R. (1986): Verzeichnis landwirts
kanadische Orangewurz	ver	German	1180	GRIN (17.3.2015): Download World Econo
kanadische Orangewurz	ver	German	5797	Wiersema, J.H. & Leon, B. (1999): World
Ohio curcuma	ver	English	4754	Unites States of America (1997): CITES Pr
Ohio Curcuma	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Orange root	ver	English	2056	
Orangenwurzel	ver	German	4754	Unites States of America (1997): CITES Pr
orangeroot	ver	English	5797	Wiersema, J.H. & Leon, B. (1999): World
orangeroot	ver	English	4754	Unites States of America (1997): CITES Pr
orangeroot	ver	English	1180	GRIN (17.3.2015): Download World Econo
orange-root	ver	English	2032	Mansfeld, R. (1986): Verzeichnis landwirts
Orange-Root	ver	English	5252	Coffey, T. (1993): The history and folklore
racirie jaunisse	ver	French	5797	Wiersema, J.H. & Leon, B. (1999): World
racirie jaunisse	ver	French	1180	GRIN (17.3.2015): Download World Econo
Radix Hydrastis	pha	Latin	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Radix Warneriae canadensis	pha	Latin	2056	
Raíz de hidrastis	ver	Spanish; Castilian	2056	
raíz de oro	ver	Spanish	1180	GRIN (17.3.2015): Download World Econo

raíz de oro	ver	Spanish; Castilian	5797	Wiersema, J.H. & Leon, B. (1999): World
Rhizoma Hydrastis	pha	Latin	5173	Steinmetz, E.F. (1957): Codex vegetabilis.
Rhizoma Hydrastis	pha	Latin	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Rhizoma Hydrastis (canadensis)	pha	Latin	4754	Unites States of America (1997): CITES Pr
Rhizome d'hydrastis	ver	French	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Rizoma d'hydraste	ver	Italian	2056	
Sceau d'or	ver	French	2056	
sceau d'or	ver	French	5797	Wiersema, J.H. & Leon, B. (1999): World
sceau d'or	ver	French	1180	GRIN (17.3.2015): Download World Econo
Sceau d'Or	ver	French	4091	Catling, P.M. & Small, E. (1994): Poorly kn
Sello dorado	ver	Spanish; Castilian	4754	Unites States of America (1997): CITES Pr
Sigillo aureo	ver	Italian	4754	
Turmeric root	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Turmeric root	ver	English	2056	
Turmeric-Root	ver	English	5252	Coffey, T. (1993): The history and folklore
wild curcuma	ver	English	4754	Unites States of America (1997): CITES Pr
wild turmeric	ver	English	4754	
Yellow eye root	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Yellow eye root	ver	English	2056	
Yellow Indian Paint	?	English	5498	Robbins, C.S., Traffic North America (7.5.1
yellow paint	ver	English	4754	Unites States of America (1997): CITES Pr
Yellow paint	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
yellow puccoon	ver	English	4754	Unites States of America (1997): CITES Pr
Yellow Puccoon	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
yellow puccoon	ver	English	6369	McGuffin, M., Kartesz, J.T., Leung, A.Y. &
Yellow Puccoon	?	English	4091	Catling, P.M. & Small, E. (1994): Poorly kn
Yellow Puccoon	ver	English	6637	Erhardt, W., Götz, E., Bödeker, N. & Seyb
Yellow root	ver	English	4754	Unites States of America (1997): CITES Pr
yellow root	ver	English	6369	McGuffin, M., Kartesz, J.T., Leung, A.Y. &
Yellow root	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
Yellow root	ver	English	2056	
Yellow Root	?	English	5252	Coffey, T. (1993): The history and folklore
Yellow Seal	ver	English	2056	List, P.H. & Hörhammer, L. (ed.) (1967-19
yelloweye	ver	English	4754	Unites States of America (1997): CITES Pr
yellow-puccoon	?		1180	GRIN (17.3.2015): Download World Econo
yellow-puccoon	ver	English	5797	Wiersema, J.H. & Leon, B. (1999): World

## Distribution Range

Distribution Range	Ref
"Goldenseal occurs in North America in the United States and Canada. It ranges from southern Vermont northward to Ontario, west to Minnesota and south to Georgia, Alabama, and Arkansas. It is common in Arkansas, Indiana, Illinois, Kentucky, Missouri, Ohio, and West Virginia; uncommon around the range perimeter. Goldenseal was historically and is currently abundant in the central portion of its range including Indiana, Kentucky, Ohio, and West Virginia [...] In Canada, it occurs only in southwestern Ontario"	3594 Oliver, L. (2017): Hydrastis canadensis. The
"Hydrastis canadensis ranges throughout much of eastern North America from Vermont to southern Ontario, Minnesota and Nebraska, south to Georgia, Alabama and Arkansas. Its range extends westward to Kansas and Oklahoma although the Oklahoma report is considered questionable [...]. The species is most abundant in Ohio, Illinois, Indiana, and eastern Kentucky, the core of its range [...]"	3605 Sharp, P.C. (2003): New England Plant Con
"its native range is SE. Canada to N. Central & E. U.S.A."	1192 Plants of the World Online (POWO). Royal B
"Native to: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Ontario, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, Wisconsin"	1192 Plants of the World Online (POWO). Royal B
"Waldgebiete in E-Kanada und USA, bes. Arkansas"	2049 Wagner, H. (1985): Pharmazeutische Biologi
"NORTHERN AMERICA: Eastern Canada: Canada - Ontario; Northeastern USA.: United States - Connecticut, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Vermont, West Virginia; North-Central USA.: United States - Illinois, Minnesota, Missouri, Nebraska, Wisconsin; Southeastern USA.: United States - Alabama, Arkansas, Delaware, Georgia, Maryland, North Carolina, Tennessee, Virginia"	1100 GRIN Database (Germplasm Resources Info
N. Amer.; also cult.	1180 GRIN (17.3.2015): Download World Econom

## Distribution

Continent	Region	ICC	Status	Free Text	Ref
7	Northern America	US		Vermont bis Minnesota und Nebraska, südlich bis Georgia, Alabama, Arkansas	2054

		US	Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey (ex), New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee	7141
72	Eastern Canada	CA	Ontario	1100
		CA	Ontario	1109
		CA	Ontario	7141
		CA native	Ontario	1107
74	North-Central U.S.A.	US	Illinois, Minnesota, Missouri, Nebraska, Wisconsin	1100
		US	Iowa	1109
		US	Minnesota	1109
		US	Wisconsin	1109
		US	Missouri	1109
		US	Illinois	1109
		US	Nebraska	1109
		US	Oklahoma	1109
		US native	Kansas	1107
		US native	Oklahoma	1107
		US native	Minnesota	1107
		US native	Illinois	1107
		US native	Iowa	1107
		US native	Wisconsin	1107
		US native	Missouri	1107
75	Northeastern U.S.A.	US	Connecticut, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Vermont, West Virginia	1100
		US	Vermont	1109
		US	Connecticut	1109
		US	Indiana	1109
		US	Massachusetts	1109
		US	New York	1109
		US	New Jersey	1109
		US	West Virginia	1109
		US	Michigan	1109
		US	Ohio	1109
		US	Pennsylvania	1109
		US native	Michigan	1107
		US native	Pennsylvania	1107
		US native	Vermont	1107
		US native	Connecticut	1107
		US native	Indiana	1107
		US native	West Virginia	1107
		US native	New York	1107
		US native	Massachusetts	1107
		US native	New Jersey	1107
		US native	Ohio	1107
78	Southeastern U.S.A.	US	Alabama, Arkansas, Delaware, Georgia, Maryland, North Carolina, Tennessee, Virginia	1100
		US	Delaware	1109
		US	North Carolina	1109
		US	Virginia	1109
		US	Arkansas	1109
		US	Alabama	1109
		US	Kentucky	1109
		US	Mississippi	1109
		US	Louisiana	1109
		US	Maryland	1109
		US	Georgia	1109
		US	Tennessee	1109
		US native	Tennessee	1107
		US native	Virginia	1107
		US native	Arkansas	1107
		US native	Maryland	1107
		US native	Georgia	1107
		US native	North Carolina	1107

US	native	Delaware	1107
US	native	Kentucky	1107
US	native	Mississippi	1107
US	native	Alabama	1107

## Abundance / Local Population Size

ICC	Abundance	Reference
	"uncommon"	8175 Albrecht, M.A. & McCarthy, B.
CA	"The Goldenseal population in Ontario is considered currently stable, albeit likely at smaller occurrence levels than at pre-settlement times, with some patches increasing and others decreasing depending on site conditions."	3887 COSEWIC (2019): COSEWIC
CA	"clonal plant that forms dense patches within a site"	3887
CA	"very few small populations remaining"	1129 National Red Lists - www.natio
US	"goldenseal subpopulations [form] "dense patches of a few to greater than 1,000 ramets with patches frequently sparsely distributed across the landscape, such that many patches are isolated from others by great distances"	3894 Sanders S. (2004): Does breed
US	"small isolated patches under natural conditions"	3605 Sharp, P.C. (2003): New Engla
US	"Limited information is available regarding the size of unharvested populations of Hydrastis canadensis because of the intense harvesting to which they are subjected. In general, wild populations of Hydrastis canadensis are small and individuals are clumped due to its vegetative reproduction and seed dispersal pattern. [...] found that populations can have less than 25 to more than 100 individuals per clump. Clumps found at the interior of a forest (i.e. oak-hickory) had more individuals than edge clumps [...]. This can "be interpreted as a reflection of the partial shade requirement, 40 to 80%, of the species."	3604 USDA Forest Service, Eastern

## Ecology

TypeEc	ICC	Ecology	Ref
grow		"The leaves become fully expanded by June prior to the development and ripening of the fruit [...]. There is little root growth during the period of rapid above-ground growth; however, once the fruit matures, root growth is more pronounced [...]. Above ground biomass peaks around mid July and declines with plant senescence until the first killing frost."	3605 Sharp, P.C. (2003): New Englan
grow		"Above ground biomass peaks around mid July and declines with plant senescence until the first killing frost."	3605
grow		"observed that the ripe seeds of mid to late summer germinated in the last week of the following April into a "plantlet" (sic) or seedling consisting of a pair of cotyledons on long petioles joined to a slender radicle and that there was no further growth that year. During the second year, the young plant sends up a single leaf, a stage that may persist through the third year. The plant matures in the third or fourth year."	3605
habit		"woodlands [...], growing in rich, moist, and often alkaline soils at altitudes of 50 to 1,200 meters"	3607 Lonner, J. (2007): Medical Plant
habit		"Rich shady woods [...] and moist areas on woodland edges [...]. Mesic, deciduous forests, often on clay soils"	1123 Plants for a Future - www.pfaf.or
habit		"In the United States Goldenseal is found in rich, densely shaded, deciduous forests [...] In Southwest Ontario Goldenseal is limited to deciduous woodlands."	3594 Oliver, L. (2017): Hydrastis cana
habit	US	"nutrient rich, mesic deciduous forests that grows in soils with plentiful amounts of leaf mold"	3605 Sharp, P.C. (2003): New Englan
habit	US	"can be found in moist rich soil with good drainage and a pH of 5.5 to 6.5 in deciduous forest (upland forest and wet-mesic forest) and woodland understories with approximately 40 to 80% shade."	3604 USDA Forest Service, Eastern F
regen		"Asexual reproduction is via rhizomes and is the primary form of propagation [...]. Rhizomes increase in size to a certain point then break up separating the plants."	3604
regen		"also propagates vegetatively and this is its primary method of reproduction [...]. It is a clonal species and aerial stems develop from the knotty, underground rhizome. Toward the end of the growing season, a "bud" may be produced on the rhizome and this bud grows into a stem in the following year [...]. This method of propagation promotes the formation of large patches of genetically similar plants. Patches of up to 100 stems in a single square meter have been documented [...]. It is not known whether large patches represent a single genotype or whether multiple genotypes occur within a patch."	3605 Sharp, P.C. (2003): New Englan
regen		"average ramet leaf-size in fall-harvested (after September) populations may recover at faster rates than populations harvested during mid-summer"	8175 Albrecht, M.A. & McCarthy, B.C.
regen		"reproduces both clonally and sexually, with clonal division more frequent than sexual reproduction"	3594 Oliver, L. (2017): Hydrastis cana
regen		"Goldenseal populations regenerate from vegetative propagules that are broken-off from the primary rhizome during harvesting activities"	8175 Albrecht, M.A. & McCarthy, B.C.
repro		"Seeds remain dormant in the soil for approximately 10 months before germinating the following spring [...]. A pair of cotyledons develops in the first year (two small spoon-shaped leaves) and a single true leaf is produced in the second year."	7224 Sinclair, A., Nantel, P. & Catling
repro		"Flowers produce seed as a result of either self-compatibility or abundant generalist pollinators."	7224
repro		"Both sexual and asexual reproduction are present in Hydrastis canadensis."	3604 USDA Forest Service, Eastern F
repro		"it has been shown that seed production is low"	3604
repro		"Fruits of Hydrastis canadensis mature in mid to late July and seeds (i.e. fruits) are dispersed during the fall potentially by animals, most likely bird species because of the red fruits"	3604

repro	"bisexual flower"	3605	Sharp, P.C. (2003): New Englan
repro	"germination of naturally sown seeds was slow"	3605	
repro	"it takes five to seven years to grow harvestable roots from seed. They also observed the propagation of <i>Hydrastis canadensis</i> from seed to be difficult with unpredictable results."	3605	
repro	"small bees (genera <i>Dialictus</i> and <i>Evylaeus</i> ) are the primary pollinators [...]. Syrphid flies and some larger bees were also observed visiting <i>H. canadensis</i> flowers. This finding is consistent with findings regarding the pollination ecology of the spring wildflower community in a temperate deciduous forest. [...] There are no research data that indicate species dependence upon specific pollinators."	3605	
repro	"capable of producing viable seed through self- and cross-fertilization around 4-5 years of age"	3607	Lonner, J. (2007): Medical Plant
repro	"reproduces primarily vegetatively (clonally via rhizomes), rather than from seed, resulting in the characteristically patchy goldenseal populations."	3607	
repro	"dispersal methods may be ineffective, as seedlings are rarely found in the wild"	3607	
repro	"mixed-breeding system in which selfing and outcrossing occur"	3594	Oliver, L. (2017): <i>Hydrastis cana</i>
repro	"Flowers and fruit are produced in the third or fourth year."	3605	Sharp, P.C. (2003): New Englan

## Life Form

Duration	Lifeform	Woodiness	Height	LF_free_txt	Ref
	geophyte				3605 Sharp, P.C. (2003): New Engla
perennial					3604 USDA Forest Service, Eastern
perennial			30 cm	"mehrjährige Pflanze"	9779 Pohl, S. & Melzig, M.F. (2015):
perennial					6198 Lange, D. (1996): MAPCIS. Me
perennial	perennial		20-50 cm	"Long-lived perennial herb, 20-50 cm tall. One basal leaf and 2 alternate cauline leaves near the top"	3604 USDA Forest Service, Eastern

## Population Status / Threat Causes

ICC	PopulationStatus	Remark	Ref
	"Approximately 80% of the original forests in New England have been lost to land conversion, which reached its peak during the 1800s. In the Canadian portion of goldenseal's range, less than 5% of its forest habitat remains from pre-settlement times."		3892 Oliver, L. & Leaman, D.J. (201
	"Because of its slow growth and low seed production, harvesting of wild population has resulted in the decimation of these populations."		3604 USDA Forest Service, Eastern
	"Decline in the quality of goldenseal habitat [...] results from ongoing impacts of agricultural expansion, urbanization, recreational use of forests, and road building and maintenance. Other threats leading to habitat degradation include loss or disturbance by flooding and/or fire, invasive species, trampling, and browsing by deer."		3892 Oliver, L. & Leaman, D.J. (201
	"Decline in the quality of habitat is due to on-going agricultural expansion, road building, urbanization, and recreational use of forests."		3594 Oliver, L. (2017): <i>Hydrastis car</i>
	"goldenseal harvesters usually collect rhizomes of the largest individuals. [...] this practice, over time, results in smaller subpopulation sizes and smaller proportions of large, reproductive individuals by adversely affecting population regeneration through both sexual and asexual reproduction"		3892 Oliver, L. & Leaman, D.J. (201
	"In many areas populations have been completely eliminated by herb collectors and in some areas, poaching is also a problem."		3607 Lonner, J. (2007): Medical Pla
	"Major threats to goldenseal populations are loss of habitat, due to development and logging, and over-harvest for the medicinal trade."		3607
	"Other threats associated with <i>Hydrastis canadensis</i> are land use practices such as habitat loss as a consequence of logging, development, agriculture, and grazing."		3604 USDA Forest Service, Eastern
	"Studies suggest that if as little as 10% of the plants from a wild populations are removed annually, these populations will go extinct over time."		3594 Oliver, L. (2017): <i>Hydrastis car</i>
	"The biggest threat to <i>Hydrastis canadensis</i> is the intense destructive rhizome harvesting that the populations endure as a consequence of its supposed medical use."		3604 USDA Forest Service, Eastern
	"threatened primarily by destruction of habitat, decline in habitat quality, wild-collection, and deer browsing"		3594 Oliver, L. (2017): <i>Hydrastis car</i>
	"Wild goldenseal subpopulations have declined dramatically due to habitat loss and degradation through forest conversion for agricultural use, urban expansion, road intrusion, and recreational use. Population decline also has been caused by commercial collection that began in the mid-1800s."		3892 Oliver, L. & Leaman, D.J. (201
CA	"Designated Threatened in April 1991. Status re-examined and confirmed in May 2000. Status re-examined and designated Special Concern in May 2019."		3887 COSEWIC (2019): COSEWIC
CA	"Goldenseal was designated as Threatened by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) in 1991 and re-assessed as Threatened by COSEWIC in 2000."		3594 Oliver, L. (2017): <i>Hydrastis car</i>
CA	"Increased survey effort has resulted in the discovery of new subpopulations of this species since the last assessment. Although the number of mature individuals of this long-lived plant appears to be stable in recent decades, the remaining subpopulations remain subject to threats from deforestation, harvesting, and invasive species."		3887 COSEWIC (2019): COSEWIC

CA	"Only 20 populations of goldenseal (defined as P0.5 km apart) are currently known in Canada. These are in southwestern Ontario, at the northern limit of the natural distribution"	7224	Sinclair, A., Nantel, P. & Catlin
CA	"This species has declined in past decades due to habitat loss and harvesting. Current threats include clearcut logging, invasive species, recreational activities, and water management (e.g., drainage ditches). The potential threat of harvesting of Goldenseal remains, yet there is no evidence that extant subpopulations are currently subject to harvesting. In terms of limiting factors, Goldenseal does not spread by seed within the majority of subpopulations and is potentially limited by the absence of natural disturbance and dispersal agents."	3887	COSEWIC (2019): COSEWIC

### Red List Status: Global and Supranational

Glo	Threat Category	Criteria	Ass.	Publ.	Ref
glo	VU	Vulnerable	A2cd+4cd	2014-04-30	2017 1206 2020 IUCN Red List of Threatened Species. Version
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>					
glo	NT	Not Threatened		1997	1109 UNEP-WCMC Threatened Species Database. Downl
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>					

### Red List Status: Countries

ICC	Threat Category	Assd.	Publd.	Ref
CA	n.a.	Special Concern	2019	2019 3887 COSEWIC (2019): COSEWIC assessment and status rep
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
CA	n.a.	Threatened		2017 3259 Government of Canada (2017): List of wildlife species at ri Accepted
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
CA	S2	Imperiled		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
CA	V	Vulnerable		1997 1109 UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US	VU	N3 / N4		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US	N3	Vulnerable		2019 3318 NatureServe (2019): NatureServe Explorer. An online enc Accepted
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	S2	Imperiled		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	V	Vulnerable		1997 1109 UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US	S4	Apparently Secure		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	S1	Critically Imperiled		2021 3891
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	V	Vulnerable		1997 1109 UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US	S3	Vulnerable		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	E	Endangered		1997 1109 UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US	S2	Imperiled		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	E	Endangered		1997 1109 UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US	S4	Apparently Secure		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	NT	Not Threatened		1997 1109 UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US	S3	Vulnerable		2021 3891 NatureServe (2021): Hydrastis candensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US	R	Rare		1997 1109 UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				

US	S3	Vulnerable	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	E	Endangered	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S1	Critically Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	S4	Apparently Secure	2021	3891	
Name used in redlist:		Hydrastis canadensis			
US	NT	Not Threatened	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S2	Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	E	Endangered	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S1	Critically Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	E	Endangered	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S2	Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	V	Vulnerable	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S1	Critically Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	E	Endangered	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S1	Critically Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	E	Endangered	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S5	Secure	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	S1	Critically Imperiled	2021	3891	
Name used in redlist:		Hydrastis canadensis			
US	EX	Extinct	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S2	Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	V	Vulnerable	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S3	Vulnerable	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	V	Vulnerable	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	S4	Apparently Secure	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	NT	Not Threatened	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			
US	K	Insufficiently Known	1997	1109	
Name used in redlist:		Hydrastis canadensis L.			
US	S4	Apparently Secure	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist:		Hydrastis canadensis			
US	NT	Not Threatened	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist:		Hydrastis canadensis L.			

US S1	Critically Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US S4	Apparently Secure	2021	3891	
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US R	Rare	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US S1	Critically Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US E	Endangered	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US S3	Vulnerable	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US V	Vulnerable	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US S3	Vulnerable	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US NT	Not Threatened	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				
US S2	Imperiled	2021	3891	NatureServe (2021): Hydrastis canadensis. Goldenseal. Na
Name used in redlist: <a href="#">Hydrastis canadensis</a>				
US R	Rare	1997	1109	UNEP-WCMC Threatened Species Database. Download o
Name used in redlist: <a href="#">Hydrastis canadensis L.</a>				

## Purpose: Free text

Purpose		Ref
animal poison	Poison (mammals)	1180 GRIN (17.3.2015): Download
	Vertebrate poisons: mammals (fide Lampe & McCann)	1100 GRIN Database (Germplasm R
environmental use	Environ. (ornamental)	1180 GRIN (17.3.2015): Download
	Environmental: ornamental (fide Eur Gard F; Zander ed14)	1100 GRIN Database (Germplasm R
food additive	"goldenseal has become a popular food supplement in the USA and other regions"	3890 Mandal, S.K., Maji, A.K., Mishr
medicine	"The benzylisoquinoline alkaloids (BIA) berberine, canadine, and hydrastine are believed to be primarily responsible for the bioactivity of goldenseal."	3893 Zuiderveen, G.H., Burkhart, E.
	"It is especially valued in treating disorders of the digestive system and mucous membranes and is also extremely useful in the treatment of habitual constipation[...].It [the root] is said to be antiperiodic, antiseptic, astringent, cholagogue, diuretic, laxative, stomachic, tonic[...]. It is used mainly in the treatment of disorders affecting the ears, eyes, throat, nose, stomach, intestines and vagina."	1123 Plants for a Future - www.pfaf.
	"Die Droge wird vorwiegend zum Stillen von inneren Blutungen (z.B. nach Entbindungen) eingesetzt und wird als Ersatz für Mutterkornalkaloide verwendet. Sie dient ferner als antibakterielles Mittel gegen Durchfall, wie auch als bitteres Tonikum, verdauungsförderndes, sanft abführendes und generelles Tonikum bei zahlreichen Beschwerden. Äußerliche Anwendung bei Entzündung der Mundschleimhaut."	3134 van Wyk, B.-E., Wink, C. & Wi
	Used to mask urinalysis tests for the detection of illicit drugs	5103 IUCN & TRAFFIC (1997): Anal
	"rhiz. (berberine hydrochloride) used in prep. of a tonic & form. a yellow dye"	3753 Mabberley, D.J. (2017): The pl
	"haemostatic; stomachic; laxative"	3751 van Wyk, B.-E. & Wink, M. (20
	"The rhizome of this plant has been used for the treatment of a variety of diseases including, gastrointestinal disorders, ulcers, muscular debility, nervous prostration, constipation, skin and eye infections, cancer, among others."	3890 Mandal, S.K., Maji, A.K., Mishr
	"Berberine is one of the most bioactive alkaloid that has been identified in different parts of goldenseal. The goldenseal extract containing berberine showed numerous therapeutic effects such as antimicrobial, antiinflammatory, hypolipidemic, hypoglycemic, antioxidant, neuroprotective (anti-Alzheimer's disease), cardioprotective, and gastrointestinal protective."	3890 Mandal, S.K., Maji, A.K., Mishr
	"The World Health Organization includes goldenseal rhizome (Rhizoma Hydrastis) among materials that have global importance in alternative medicine, with its main use described in pharmacopeias and 'well established documents' as a treatment for digestive complaints, in addition to a variety of other traditional uses."	3892 Oliver, L. & Leaman, D.J. (201
	"Goldenseal currently is used mainly as a component of traditional herbal medicine formulations marketed as licensed Natural Health Products (NHPs) in Canada and as dietary supplements in the United States"	3892 Oliver, L. & Leaman, D.J. (201
Medic. (source of hydrastine)	1180 GRIN (17.3.2015): Download	

"Native Americans and Canadian First Nations have used various parts of this plant - especially the rhizomes and roots - in traditional remedies for cancer, eye ailments, inflammation, digestive problems, pneumonia, and heart problems."	3892	Oliver, L. & Leaman, D.J. (2018): Protecting Goldenseal. How status assessments inform conservation. <i>HerbalGram</i> 119: 40-55. Retrieved from <a href="https://www.herbalgram.org/resources/herbalgram/issues/119/table-of-contents/hg119-feat-goldenseal/">https://www.herbalgram.org/resources/herbalgram/issues/119/table-of-contents/hg119-feat-goldenseal/</a> , viewed: 30.03.2021.
Traditional North American medicine	3751	van Wyk, B.-E. & Wink, M. (2017): Medicinal Plants of the World. Springer, Berlin.
Traditional European medicine	3751	van Wyk, B.-E. & Wink, M. (2017): Medicinal Plants of the World. Springer, Berlin.
"traditionally used by Native Americans as a coloring agent and as medicinal remedy for common diseases and conditions like wounds, digestive disorders, ulcers, skin and eye ailments, and cancer"	3890	Mandal, S.K., Maji, A.K., Mishr, S. (2017): <i>Hydrastis canadensis</i> L. - A Review. <i>Journal of Pharmacology and Therapeutics</i> 48(1): 1-10.

## Purpose: Standardized Fields of Use

Purpose: Fields of Use	Frequency
animal poison	2
environmental use - horticulture	2
food additive - general	1
medicine - general	10
medicine - source of pharmaceutical agent	1
medicine - used traditionally as herbal remedy	4

## Purpose: Number of use fields

Purpose: Number of level-1 use fields
6

## Plant Parts Used

Plant Part (standardized)	Plant Part (free text)	Remark	Ref
fruit			3594 Oliver, L. (2017): <i>Hydrastis canadensis</i> . The IUCN Red List of Threatened Species 2017. e.T44340011A44340071. Retrieved from <a href="https://www.iucnredlist.org/species/44340011/44340071">https://www.iucnredlist.org/species/44340011/44340071</a> , viewed: 22.02.2021.
seed			3594 Oliver, L. (2017): <i>Hydrastis canadensis</i> . The IUCN Red List of Threatened Species 2017. e.T44340011A44340071. Retrieved from <a href="https://www.iucnredlist.org/species/44340011/44340071">https://www.iucnredlist.org/species/44340011/44340071</a> , viewed: 22.02.2021.
leaf			3594 Oliver, L. (2017): <i>Hydrastis canadensis</i> . The IUCN Red List of Threatened Species 2017. e.T44340011A44340071. Retrieved from <a href="https://www.iucnredlist.org/species/44340011/44340071">https://www.iucnredlist.org/species/44340011/44340071</a> , viewed: 22.02.2021.
root	"roots, leaves, seeds, fruits, and whole plants"		3594 Oliver, L. (2017): <i>Hydrastis canadensis</i> . The IUCN Red List of Threatened Species 2017. e.T44340011A44340071. Retrieved from <a href="https://www.iucnredlist.org/species/44340011/44340071">https://www.iucnredlist.org/species/44340011/44340071</a> , viewed: 22.02.2021.
rhizome	rhizome		3751 van Wyk, B.-E. & Wink, M. (2017): Medicinal Plants of the World. Springer, Berlin.
root	rhizome		3134 van Wyk, B.-E., Wink, C. & Wink, M. (2004): <i>Hydrastis canadensis</i> . <i>Phytotherapy Research</i> 18(1): 1-10.
root	root		3751 van Wyk, B.-E. & Wink, M. (2017): Medicinal Plants of the World. Springer, Berlin.

## Scale and Trend of Trade

ICC	Trade Trend	Ref
	"Demand for goldenseal has increased over time, as applications have expanded beyond traditional and local uses and interest has been renewed in herbal medicines in North America and internationally."	3892 Oliver, L. & Leaman, D.J. (2018): Protecting Goldenseal. How status assessments inform conservation. <i>HerbalGram</i> 119: 40-55. Retrieved from <a href="https://www.herbalgram.org/resources/herbalgram/issues/119/table-of-contents/hg119-feat-goldenseal/">https://www.herbalgram.org/resources/herbalgram/issues/119/table-of-contents/hg119-feat-goldenseal/</a> , viewed: 30.03.2021.
	"In Amerika. v.a. in den USA, wird die Pflanze [...] wieder beliebter und gewinnt an Bedeutung zur Behandlung von Erkältungskrankheiten, Gastritis und Reizdarm."	9779 Pohl, S. & Melzig, M.F. (2015): Porträt. <i>Hydrastis canadensis</i> . <i>Kanadische Gelbwurz. Zeitschrift für Phytotherapie</i> 36(3): 133-139.
	"The demand for Goldenseal due to its medicinal qualities continues to rise. [...] The market for Goldenseal is expected to grow at a rate of 5% to 10% annually, and the market for high quality cultivated material is expected to grow 10 to 15% annually."	3594 Oliver, L. (2017): <i>Hydrastis canadensis</i> . The IUCN Red List of Threatened Species 2017. e.T44340011A44340071. Retrieved from <a href="https://www.iucnredlist.org/species/44340011/44340071">https://www.iucnredlist.org/species/44340011/44340071</a> , viewed: 22.02.2021.
	According to the CITES trade records for 2010-2019, the main exporting country was Canada with a total of 13 mt of roots in the period 2010-2017. Almost 10 mt of the Canadian export were directed to the US which makes the US the biggest importer. Other importing countries were Australia (2,4 mt in 2010-2017) and Germany (1,5 mt). In the same period, the United States exported a total of 9,3 mt.	1167 UNEP-WCMC. CITES Trade Database. - <a href="https://www.unep-wcmc.org/resources-and-data/cites-trade-database">https://www.unep-wcmc.org/resources-and-data/cites-trade-database</a>

## Utilization: commodity, cultivation, harvest, socio-cultural significance, sustainability, trade

Type	ICC	Utilization	Ref
com		"Dried leaves may be traded when root material is scarce."	5103 IUCN & TRAFFIC (1997): Anal
com		"Dried, whole rootstock including attached roots (crude drug) or the same cut (cut drug); in addition the powdered rootstock."	7143 Lange, D. & Schippmann, U. (2017): <i>Hydrastis canadensis</i> . <i>Phytotherapy Research</i> 31(1): 1-10.
com		"Fibrous roots are also sold with the roots."	5103 IUCN & TRAFFIC (1997): Anal
com		"Goldenseal roots, leaves, seeds, fruits, and whole plants are sold as fresh, powdered, or dried material."	3594 Oliver, L. (2017): <i>Hydrastis canadensis</i> . The IUCN Red List of Threatened Species 2017. e.T44340011A44340071. Retrieved from <a href="https://www.iucnredlist.org/species/44340011/44340071">https://www.iucnredlist.org/species/44340011/44340071</a> , viewed: 22.02.2021.
com		"Retail products include roots (whole, chopped and powdered), tinctures, capsules, tablets, extracts and other items."	5103 IUCN & TRAFFIC (1997): Anal
com		"rhizome/root and aerial parts"	3889 Kruger, S.D., Munsell, J.F., Ch

com		"Rhizomes seem to be the preferred target for harvest because they have the highest concentration of medicinally-active alkaloids."	3594	Oliver, L. (2017): Hydrastis car
com		Roots and dried plants are the major export term used in CITES Annual Trade Reports 1977-2002.	7150	UNEP-WCMC (8.1.2004): CIT
com		Traded as a dried crude botanical (roots), also as extract; limited trade in alkaloids exists	5103	IUCN & TRAFFIC (1997): Anal
cul		"Although nearly all material in trade continued to come from wild collection until the early 2000s, there has been a shift in the international market to cultivated sources in recent years. CITES Trade Database (2000-2016) indicates that the majority of material in international trade is now from artificially propagated plants."	3892	Oliver, L. & Leaman, D.J. (201
cul		"amount of cultivated material in trade is increasing"	3594	Oliver, L. (2017): Hydrastis car
cul		"In Central Europe, Austria, Russia, and the former Czechoslovakia experimentally cultivated for drug production. In North America cultivated for the drug (Rhizoma Hydrastis) and as ornamental."	1122	Mansfeld's World Database of
cul		"In recent years, there has been a shift in the international market from mostly wild-harvested to cultivated sources. In 1998, the American Herbal Products Association (AHPA) recorded only 2% of material in trade from cultivated sources. The CITES Trade Database (2000-2013) indicates that much of the legally harvested material in international trade now originates from cultivated plants, indicating an increase of up to 41% cultivated Goldenseal between 2000-2010."	3594	Oliver, L. (2017): Hydrastis car
cul		"wild-harvested goldenseal material has substantially declined relative to the increasing supply of cultivated material in the international market"	3892	Oliver, L. & Leaman, D.J. (201
exp	US	Exports of 9.6 tonnes of roots in 1994-1995 according to the CITES proposal; another 10 tonnes exported acc. to APHIS-USDA data for 1995-1996	5103	IUCN & TRAFFIC (1997): Anal
har		"[benzylisoquinoline alkaloid (BIA)] levels were found to be higher in the belowground parts compared to aerial. Moreover, BIA concentrations peaked in both plant aerial and belowground portions at the flowering stage and in the belowground parts at dormancy, suggesting that an early season harvest of aerial tops could be explored in farmed populations in addition to traditional late season "root" harvests. Additionally, hydrastine and canadine levels were found to be greatest in aerial portions at 1600 h over a 24h range, which suggests late day as the best time for aerial harvests."	3893	Zuiderveen, G.H., Burkhart, E.
har		"Die Droge wird vorwiegend am Wildstandort gesammelt; möglicherweise sind die Bestände dadurch bedroht."	3134	van Wyk, B.-E., Wink, C. & Wi
har		"Late summer and fall represents the period in which goldenseal rhizomes are traditionally gathered."	8175	Albrecht, M.A. & McCarthy, B.
har		"While Goldenseal has been cultivated for 100+ years, much of the material traded both domestically and internationally still comes from wild-harvested plants."	3594	Oliver, L. (2017): Hydrastis car
imp		"The export market is relatively small and limited primarily to countries with Western herbal medicine traditions, such as Australia and the United Kingdom. Goldenseal also is exported to Europe in small quantities for use in two traditional German systems of medicine: anthroposophical medicine and homeopathic medicine"	3892	Oliver, L. & Leaman, D.J. (201
price	CA	"A highly prized medicinal plant"	1129	National Red Lists - www.natio
socu		"As of 2005, nearly all of the wild-collected material was collected by small-scale diggers from the southern Appalachian range and Missouri, and 40% of the overall supply of Goldenseal was from cultivated material. [...] The high prices paid for wild-collected roots and rhizomes in the herbal market has increased collection pressure, especially in parts of the species' range where unemployment is high."	3594	Oliver, L. (2017): Hydrastis car
socu		"In the 1900s, increased demand for goldenseal was caused in part by its unfounded reputation for masking illicit or performance-enhancing drugs in urine tests. This myth apparently grew from a murder mystery published in 1900 in which goldenseal bitters were erroneously identified as strychnine, which inspired an otherwise unfounded association of goldenseal with chemical testing errors in American folklore"	3892	Oliver, L. & Leaman, D.J. (201
socu		"wild collection remains an important source of income in parts of the species' range where unemployment is high"	3594	Oliver, L. (2017): Hydrastis car
socu		"Wild harvest in some parts of the species' range in the United States is likely increasing, especially where wild collection remains an important source of income and unemployment is high."	3892	Oliver, L. & Leaman, D.J. (201
tra		"In the 2010 tonnage report from the American Herbal Products Association an average of 50 tons of dried root (both cultivated and wild combined) is reported between 1998 and 2010, while also noting that market demand was steady during this 13-year period [...]. Further, between 1998 and 2010, an average of 77% or 38 tons of the yearly volume purchased was from wild collected Goldenseal."	3594	Oliver, L. (2017): Hydrastis car
tra		"Off-root species were purchased at three different levels of frequency. The most commonly purchased was goldenseal (32%), followed by bloodroot (25%), and black cohosh (22%)"	3889	Kruger, S.D., Munsell, J.F., Ch
tra		"The most frequently purchased off-root [other than American ginseng] species [in survey of Ginseng traders in 15 eastern US states] were the roots and rhizomes of two perennial understory plants: black cohosh ( <i>Actaea racemosa</i> L.) and goldenseal ( <i>Hydrastis canadensis</i> L.)"	3889	
tra		"The rise of the popularity in herbal medicine in the last quarter of the 20th century increased demand for off-root species like goldenseal ( <i>Hydrastis canadensis</i> L.), slippery elm ( <i>Ulmus rubra</i> Muhl.), and black cohosh"	3889	

tra	CA	"All herbal medicinal products containing goldenseal, whatever their origin, must contain only cultivated material to receive marketing authorization and a product license for commercial sale in Canada."	3892	Oliver, L. & Leaman, D.J. (201
tra	US	"For the 1998-2017 harvest years [...] tonnage of dried goldenseal root entering the market is predominantly from wild-harvested sources. According to industry experts, the number of cultivators for goldenseal remains low due to hur[d]les to entering cultivation such as lack of available root stock, timing from initial planting to harvest of crop, and regulation and policy around the status of the harvested material. [...] because of the low number of cultivators, harvested quantities from year to year is not necessarily reflective if market demand [for cultivated material]."	3903	Chittum, H., Johnson, H. & Fle
tra	US	"The Appalachian [USDA Forest Inventory and Analysis] units in Kentucky, Ohio, Virginia, and West Virginia supplied 82 percent of the bloodroot, 99 percent of the black cohosh, and 83 percent of the goldenseal purchased during the study period."	3889	Kruger, S.D., Munsell, J.F., Ch

## Legislation

### Legislation Annex Source Taxon

CITES	II	6386	UNEP-WCMC (2001): Annotated CITES Appendices and Reservations. C
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## Regulation

### ICC Regulation

			Ref	
		"Goldenseal was listed in Appendix II of CITES [...] in 1997 due to concern over wild-collection, with an annotation to regulate roots. Its annotation was amended in 2007 to clarify that the listing applied to international trade of underground parts (roots and rhizomes including whole, parts, and powdered). A CITES Appendix-II listing requires that exporters obtain export permits or certificates for international trade. These permits are issued when specimens are considered legally acquired and international trade is considered not detrimental to the survival of the species in the wild."	3594	Oliver, L. (2017): Hydrastis can
CA		"Part 3. Threatened Species"	3259	Government of Canada (2017):
CA		"Goldenseal was assessed by COSEWIC as Threatened in May 2000 and is listed as Threatened on Schedule 1 of the federal Species at Risk Act (SARA); in May 2019, COSEWIC reassessed the species as Special Concern. Goldenseal is also listed as threatened under Schedule 4 of the Ontario Endangered Species Act 2007."	3887	COSEWIC (2019): COSEWIC
CA		"Goldenseal receives protection under Ontario's Endangered Species Act and the Canadian federal Species at Risk Act (SARA)."	3594	Oliver, L. (2017): Hydrastis can
US		"Goldenseal is not listed under the US Endangered Species Act and therefore is not protected under US federal law."	3892	Oliver, L. & Leaman, D.J. (201
US		"There is no federal protection for Goldenseal in the United States."	3594	Oliver, L. (2017): Hydrastis can

## Bibliography

- 1100 GRIN Database (Germplasm Resources Information Network). USDA-ARS. Retrieved from <https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch.aspx>
- 1107 USDA Plants Database (27.4.2009): Download of Pteridophyte, Gymnosperm, Monocot and Docot data with information on state and province distribution, duration, growth form and native status from <http://plants.usda.gov>, accessed 27.4.2009.
- 1109 UNEP-WCMC Threatened Species Database. Download of 1997 regional threat assessments sent 15.6.2011 by H. Gillett. Cambridge, UK (cf. Walter & Gillett, 1997 IUCN Red List of threatened plants)
- 1122 Mansfeld's World Database of Agricultural and Horticultural Crops. [mansfeld.ipk-gatersleben.de/pls/html\\_db\\_pgrc/f?p=185:3:3650108710811243](http://mansfeld.ipk-gatersleben.de/pls/html_db_pgrc/f?p=185:3:3650108710811243)
- 1123 Plants for a Future - [www.pfaf.org](http://www.pfaf.org)
- 1129 National Red Lists - [www.nationalredlist.org/site.aspx?pageid=117](http://www.nationalredlist.org/site.aspx?pageid=117)
- 1167 UNEP-WCMC. CITES Trade Database. - <https://www.unep-wcmc.org/resources-and-data/cites-trade-database>
- 1180 GRIN (17.3.2015): Download World Economic Plants report from GRIN Taxonomy for the query. Medizin = 'Alle Nutzungen'. Retrieved from <http://www.ars-grin.gov/cgi-bin/npgs/html/taxecon.pl?language=de>
- 1192 Plants of the World Online (POWO). Royal Botanic Gardens, Kew - <http://plantsoftheworldonline.org/>
- 1199 Brinckmann, J., Kathe, W., Berhoudt, K. & Schippmann, U. (2020): Detailed analysis of global commercial cultivation of medicinal and aromatic plants (MAP). Unpublished project report for BfN. 36 pp. Bonn.
- 1206 2020 IUCN Red List of Threatened Species. Version 2020-3. [www.iucnredlist.org](http://www.iucnredlist.org). Download of plant data received from IUCN 14.1.2021.
- 2032 Mansfeld, R. (1986): Verzeichnis landwirtschaftlicher und gärtnerischer Kulturpflanzen (ohne Zierpflanzen), 4 volumes. Springer, Berlin.
- 2049 Wagner, H. (1985): Pharmazeutische Biologie. 2. Drogen und ihre Inhaltsstoffe, 2. ed. Stuttgart.
- 2054 Encke, F., Buchheim, G. & Seybold, S. (1993): Zander, Handwörterbuch der Pflanzennamen. 14th edition. Ulmer, Stuttgart.
- 2056 List, P.H. & Hörhammer, L. (ed.) (1967-1977): Hagers Handbuch der Pharmazeutischen Praxis 1-7. 4. edition. Springer, Berlin.
- 2302 Native American Ethnobotany Database - <http://naeb.brit.org/>
- 2402 Bundesministerium für Gesundheit und Soziale Sicherung (ed.) (2004): Homöopathisches Arzneibuch 2004 - HAB 2004. Amtliche Ausgabe, 2 volumes. Deutscher Apothekerverlag, Stuttgart, Eschborn.
- 3134 van Wyk, B.-E., Wink, C. & Wink, M. (2004): Handbuch der Arzneipflanzen. Wissenschaftliche Verlagsgesellschaft.
- 3259 Government of Canada (2017): List of wildlife species at risk. Schedule 1. Act current to 2017-07-12 and last amended on 2017-06-18. Retrieved from <https://www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding/listing-proces>
- 3318 NatureServe (2019): NatureServe Explorer. An online encyclopedia of life. Version 7.1. Retrieved from <http://explorer.natureserve.org/servlet/NatureServe?init=Species>, viewed: 02.01.2020.
- 3594 Oliver, L. (2017): Hydrastis canadensis. The IUCN Red List of Threatened Species 2017. e.T44340011A44340071. Retrieved from <https://www.iucnredlist.org/species/44340011/44340071>, viewed: 22.02.2021.
- 3604 USDA Forest Service, Eastern Region (2003): Conservation assessment for Goldenseal (*Hydrastis canadensis* L.). Retrieved from [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsm91\\_054345.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm91_054345.pdf).

- 3605 Sharp, P.C. (2003): New England Plant Conservation Program. *Hydrastis canadensis* L. Goldenseal. Conservation and research plan for New England. Retrieved from <http://www.newfs.org/docs/pdf/Hydrastiscanadensis.pdf>.
- 3607 Lonner, J. (2007): Medical Plant Fact Sheet. *Hydrastis canadensis* / Goldenseal. A collaboration of the IUCN Medicinal Plant Specialist Group, PCA-Medicinal Plant Working Group, and North American Pollinator Protection Campaign. Retrieved from <http://www.p>
- 3751 van Wyk, B.-E. & Wink, M. (2017): Medicinal plants of the world. 2nd edition. CABI, Wallingford & Boston.
- 3753 Mabberley, D.J. (2017): The plant-book. 4th edition. Cambridge University Press, Cambridge.
- 3887 COSEWIC (2019): COSEWIC assessment and status report on the Goldenseal *Hydrastis canadensis* in Canada. Retrieved from <https://species-registry.canada.ca/index-en.html> - /species/221-177, viewed: 30.03.2021.
- 3889 Kruger, S.D., Munsell, J.F., Chamberlain, J.L., Davis, J.M. & Huish, R.D. (2020): Describing medicinal non-timber forest product trade in eastern deciduous forests of the United States. *Forests* 11(4): 435. Retrieved from <https://www.mdpi.com/1999-4907/11/>
- 3890 Mandal, S.K., Maji, A.K., Mishra, S.K., Ishfaq, P.M., Devkota, H.P., Silva, A.S. & Das, N. (2020): Goldenseal (*Hydrastis canadensis* L.) and its active constituents. A critical review of their efficacy and toxicological issues. *Pharmacological Research* 160
- 3891 NatureServe (2021): *Hydrastis canadensis*. Goldenseal. NatureServe Explorer. Retrieved from [https://explorer.natureserve.org/Taxon/ELEMENT\\_GLOBAL.2.154701/Hydrastis\\_canadensis](https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.154701/Hydrastis_canadensis), viewed: 30.03.2021.
- 3892 Oliver, L. & Leaman, D.J. (2018): Protecting Goldenseal. How status assessments inform conservation. *HerbalGram* 119: 40-55. Retrieved from <https://www.herbalgram.org/resources/herbalgram/issues/119/table-of-contents/hg119-feat-goldenseal/>, viewed: 30.03.2
- 3893 Zuiderveen, G.H., Burkhart, E.P. & Lambert, J.D. (2021): Benzylisoquinoline alkaloid content in goldenseal (*Hydrastis canadensis* L.) is influenced by phenological stage, reproductive status, and time-of-day. *Phytochemistry Letters* 42: 61-67. Retrieved from
- 3894 Sanders S. (2004): Does breeding system contribute to rarity of Goldenseal (*Hydrastis canadensis*)?. *American Midland Naturalist* 152: 37-42. Retrieved from [https://www.researchgate.net/publication/232662213\\_Does\\_Breeding\\_System\\_Contribute\\_to\\_Rarity\\_of\\_Gold](https://www.researchgate.net/publication/232662213_Does_Breeding_System_Contribute_to_Rarity_of_Gold)
- 3903 Chittum, H., Johnson, H. & Fletcher, E. (2021): Tonnage survey of select North American wild-harvested plants 2011-2017. AHPA, Silver Spring MD.
- 4091 Catling, P.M. & Small, E. (1994): Poorly known economic plants of Canada. 3. *Hydrastis canadensis* L. CBA/ABC Bulletin 27 (3): 50-51.
- 4754 United States of America (1997): CITES Proposal. Inclusion of *Hydrastis canadensis* in Appendix II of the Convention (final version).
- 5103 IUCN & TRAFFIC (1997): Analyses of proposals to amend the CITES Appendices submitted to the tenth Meeting of the Conference of the Parties, Harare, Zimbabwe, 9-20 June 1997. IUCN, sine loco.
- 5173 Steinmetz, E.F. (1957): *Codex vegetabilis*. Published by the author, Amsterdam.
- 5252 Coffey, T. (1993): The history and folklore of North American wildflowers. Facts on File, New York.
- 5473 Moerman, D.E. (1998): Native American ethnobotany. Timber Press, Portland.
- 5498 Robbins, C.S., Traffic North America (7.5.1998): in litt. to the German CITES Scientific Authority.
- 5525 Penso, G. & Proserpio, G. (1997): Index plantarum medicinalium totius mundi eorumque synonymorum. 2nd edition. OEMF, Milano.
- 5641 Lange, D. (1998): Europe's medicinal and aromatic plants. Their use, trade and conservation. Traffic International, Cambridge.
- 5797 Wiersema, J.H. & Leon, B. (1999): World economic plants. A standard reference. CRC Press, Boca Raton.
- 6198 Lange, D. (1996): MAPCIS. Medicinal and Aromatic Plant Conservation Information System. - Database (dBaseIV). Compiled for the Bundesamt für Naturschutz, Bonn.
- 6369 McGuffin, M., Kartesz, J.T., Leung, A.Y. & Tucker, A.O. (2000): Herbs of commerce. 2nd edition. AHPA, Silver Spring, USA.
- 6386 UNEP-WCMC (2001): Annotated CITES Appendices and Reservations. CITES Secretariat & UNEP WCMC, Genève.
- 6637 Erhardt, W., Götz, E., Bödeker, N. & Seybold, S. (2000): Zander, Handwörterbuch der Pflanzennamen. Dictionary of plant names. Dictionnaire des noms de plantes. 16th edition. Ulmer, Stuttgart.
- 7141 UNEP-WCMC (s.dat.): Species+. Retrieved from <http://www.speciesplus.net/>, viewed: 21.11.2014.
- 7143 Lange, D. & Schippmann, U. (2001): Identification manual flora. Section 4. Parts and derivatives. Medicinal and aromatic plants. CITES Secretariat, Geneva.
- 7150 UNEP-WCMC (8.1.2004): CITES Trade Database. Net export tables and comparative tabulations for selected medicinal plant species. Unpublished report, Cambridge.
- 7224 Sinclair, A., Nantel, P. & Catling, P. (2005): Dynamics of threatened goldenseal populations and implications for recovery. *Biological Conservation* 123: 355-360.
- 7279 van Wyk, B.-E. & Wink, M. (2004): Medicinal plants of the world. Timber Press, Portland.
- 8175 Albrecht, M.A. & McCarthy, B.C. (2006): Comparative analysis of goldenseal (*Hydrastis canadensis* L.) population re-growth following human harvest. Implications for conservation. *American Midland Naturalist* 156 (2): 229-236.
- 8300 Anon. (2007): WHO monographs on selected medicinal plants 3. WHO, Geneva.
- 8375 Medicines and Healthcare Products Regulatory Agency (2008): British Pharmacopoeia 2009. 4 volumes. Stationery Office, London.
- 8379 United States Pharmacopoeial Convention (ed.) (2008): The United States Pharmacopoeia USP 32. The national formulary NF 27. 2009. 3 volumes. United States Pharmacopoeial Convention, Rockwell, MD.
- 8380 European Directorate for the Quality of Medicines & Health Care (EDQM) (ed.) (2007-2009): European Pharmacopoeia. 6th edition. 2 volumes and 8 supplements. Council of Europe, Strasbourg.
- 8394 Therapeutic Goods Administration (ed.) (2007): Substances that may be used in listed medicines in Australia. Therapeutic Goods Administration, Symonston. Retrieved from <http://www.tga.gov.au/cm/listsubs.pdf>, viewed: 25.01.2009.
- 8418 Brandão, M.G.L., Cosenza, G.P., Assis Moreira, R. & Monte-Mor, R.L.M. (2006): Medicinal plants and other botanical products from the Brazilian Official Pharmacopoeia. *Revista Brasileira de Farmacognosia* 16 (3): 408-420.
- 8450 Homoeopathic Pharmacopoeia of the United States (s.dat.): HPUS Online Database. Retrieved from <http://www.hpus.com>, viewed: 26.10.2009.
- 8865 ANVISA (2010): Farmacopeia Brasileira. 5th edition. 2 vols. Agência Nacional de Vigilância Sanitária, Brasília.
- 8875 European Directorate for the Quality of Medicines & Health Care (EDQM) (2012): European Pharmacopoeia. Pharmacopée Européenne. 7.8 edition. USB stick version. Council of Europe, Strasbourg.
- 8876 United States Pharmacopoeial Convention (2013): The United States Pharmacopoeia USP 37. The National Formulary 32. 2014. United States Pharmacopoeial Convention, Rockwell, MD.
- 9779 Pohl, S. & Melzig, M.F. (2015): Porträt. *Hydrastis canadensis*. Kanadische Gelbwurz. *Zeitschrift für Phytotherapie* 36 (3): 133-139.

## Abbreviations and Standards

ICC = ISO Country Codes    Ref = literature reference

Altitude: Low / High = minimum and maximum limits of altitude range [m]

Legislation: Source Taxon = name of taxon as contained in legislation

### Utilization: TypeUtil

<i>TypeUtil</i>	<i>TypeUtilLong</i>
com	commodity
cul	cultivation
exp	export
har	harvest
imp	import
price	price
pur	purpose
rem	remark
socu	socio-cultural significance
sus	sustainability
tra	trade
trend	trend and scale of trade
use	uses

### Distribution Status: Standard

<i>Status</i>	<i>Explanation</i>
chk	check entry
nat	native
int	introd., established
adv	introduced, not established
ocd	occurrence doubtful
unc	status unclear
ext	extinct
cul	cultivated
sou	source doubtful
ica	introduced (casual or naturalized)
don	doubtfully native
pex	(presumably) extinct
ali	casual alien
nzd	naturalized
nna	not native
dpn	status doubtful, possibly native
abs	absent but reported in error

### Common names: Type

<i>TypeShort</i>	<i>Type</i>
?	<unknown>
ayn	ayurvedic name
hom	homoeopathic name
pha	pharmaceutical name
scn	standardized common name
tra	trade name
ver	vernacular name

### Ecology: TypeEcol

<i>TypeEcol</i>	<i>Explanation</i>
alti	altitude
grow	growth rate
habit	habitat
morph	morphology
regen	regeneration
repro	reproduction
soil	soil