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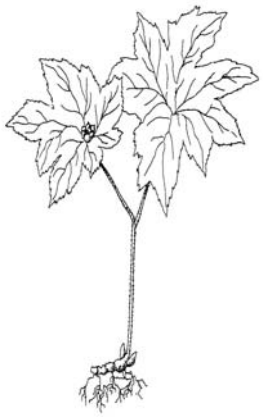
Goldenseal (*Hydrastis canadensis* L.)



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Introduction

Botanical Information

Hydrastis canadensis L., member of the Ranunculaceae family, is native to North America with a natural range extending from southern Quebec to northern Georgia, and west to Missouri. Goldenseal is an herbaceous perennial and can be found in rich, densely shaded, deciduous forests. The plant emerges in early spring from buds that overwinter on the perennial rootstock, growing each year to a height of eight to fourteen inches. The leaf is cordate-shaped with a long petiole and can have three to seven lobes. The margins of the leaves are double serrated. Leaves can span three to twelve inches in diameter and three to eight inches long. The single greenish-white flower blooms briefly from late April to May, depending upon location. A berry forms, turning red in July, and contains up to thirty black seeds. The tumeric-colored rhizome and fibrous roots are harvested after the fifth growing season (or later), when the plant is started from seed.

High demand for goldenseal has caused a serious reduction in native populations throughout its native range. In North Carolina, it was classified as an endangered species for many years. This made harvesting on public lands illegal and required growers to obtain permits to cultivate it. In December of 2010, however, the North Carolina Department of Agriculture and Consumer Services Plant Conservation Board removed goldenseal from the protected plant species list. There are no longer any state restrictions on harvesting or cultivating goldenseal. However, you probably will not be issued a permit to collect goldenseal from federal forests within the state. Goldenseal is still protected on a federal and international level. It is still listed on Appendix II of the Convention for International Trade on Endangered Species of Wild Fauna and Flora (CITES), an international treaty monitoring trade in threatened and endangered species. This means that a CITES permit is required to sell goldenseal to other countries. To get such a permit, you need to be able to show that the plants are at least four years old and were obtained legally.

Bioactive Components

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

Uses and Treatments

Native Americans have used goldenseal in a variety of ways, including as a general antiseptic and a treatment for snakebites. Renewed interest from herbalists in the United States, in the 1990's, sparked new demand for this material in Europe. Modern medicinal uses for goldenseal include the treatment of nasal congestion, digestive disorders, and AIDS.

Cultivation Practices

Site Selection

The western portion of North Carolina is considered part of goldenseal's prime natural range. Goldenseal grows best in a rich, moist, loamy soil with good air and water drainage and approximately 70-75% shade. Avoid planting in a poorly drained soil. Choose a site with a slight slope to help improve drainage. If an open field is used for production, shade structures will need to be erected. Typically, a wood lath structure or polypropylene shade structure is used. For forest culture, select a site with good air and water drainage in an area shaded by tall, hardwood trees like basswood, hickory, tulip poplar, or white oak. Look for an area where understory woodland plants grow such as black cohosh, bloodroot, ginseng, mayapple, or trillium. If goldenseal is not grown in ideal forest soils, raised beds are recommended, especially for soils high in clay. Make sure sufficient compost or other organic material is added to the planting beds to improve soil tilth and fertility. Soils with a pH range of 5.5-6.5 are ideal for growing goldenseal. Areas where problems have occurred due to soil-borne diseases should be avoided.

Planting

Goldenseal can be propagated from rhizome pieces, root cuttings, or from seed. To propagate from seed, the berry must be harvested as soon as it is mature, then processed by carefully mashing the fruit to separate out the seeds. This process can take several days, as the seeds and pulp need to ferment in water until they can easily be separated. The seeds must never dry out. When cleaned and rinsed thoroughly, sow the seeds one-quarter to one-half inch deep in a shaded nursery bed, and space the seeds one to two inches apart. Cover with several inches of leaf mulch to prevent the soil from drying out.

Germination of goldenseal seed can be slow, erratic, and unpredictable. It is not uncommon for all or part of a seed bed to take two seasons before germinating. Richo Cech, author of *Growing At-Risk Medicinal Plants*, recommends waiting to transplant the seedlings into permanent production beds until they are two years old and have formed a rhizome. The most common and reliable method for propagating goldenseal is from rhizome pieces. Cut rhizomes into one-half inch or larger pieces, keeping the fibrous roots attached, and trying to have at least one big bud present per piece. In a well-prepared bed, plant the rhizome pieces in the ground, right below the soil surface, with the bud pointed upright.

Space rhizome pieces six inches apart with rows six to twelve inches apart. Add a thick layer of mulch, using hardwood leaves or shredded hardwood bark. The mulch should be raked back to a depth of one to two inches before the plants emerge in the spring. Lee Sturdivant and Tim Blakley, authors of *Medicinal Herbs in the Garden, Field, and Marketplace*, write on another method of propagation from root cuttings, "Buds and plants will form on the fibrous roots that grow away from the main root. These pieces can be planted separately." Not everyone has success with this method. Use the same planting directions as above. Keep all beds free from weeds. Weed control is very important the first few years.

Insects and Diseases

Under natural conditions in the forest, goldenseal has minimal problems with diseases or insects. Slugs are often a problem in small plots in the Southeast. They can eat the entire crown of the plant as well as the fruit. If the populations of slugs are intolerable and control measures do not work, it may be necessary to remove the mulch from around the plants. Moles and voles have also been known to damage goldenseal beds. Root knot nematodes will also severely reduce growth and root yield of goldenseal.

The book, *Index of Plant Diseases in the United States*, lists the following diseases that have been known to affect *Hydrastis canadensis*: leaf blights, *Alternaria* sp. and *Botrytis* sp.; *Fusarium* wilt; root knot nematodes, *Meloidogyne* spp.; root rots, *Phymatotrichum omnivorum* and *Rhizoctonia solani*; and an unidentified mosaic virus.

Harvesting, Cleaning, and Drying

Roots are harvested in the fall after the tops have died down. Harvesting usually begins five to seven years from seeding or four to six years from rhizome transplants. Dig roots carefully, keeping the fibrous roots intact. Small plots can be dug with a fork, but a larger field requires a mechanical digger like a modified potato, horseradish, or bulb digger. Select large, healthy plants for replanting (in a new area) and have a container available to keep them moist and cool. Carefully wash the remaining roots by spraying with a hose over a large-mesh screen. Remove all dirt, breaking larger roots if necessary, but do not use a brush. Commercial ginseng root washers are available that consist of a drum that turns and tumbles the roots as water is sprayed over them.

Spread the washed roots on screens, and dry in a well-ventilated area in the shade or in a forced air drier. Simple driers can be constructed from small sheds or rooms in barns. Bulk tobacco barns can also be modified for drying goldenseal roots. Keep temperatures low, around 95-100^0 F, and provide good airflow around the roots. Roots will lose about 70% of their weight during drying. To test for dryness, break a large root. It should snap but not be brittle. Pack dried roots loosely into cardboard cartons or barrels, in clean untreated burlap sacks, or in poly-sacks. Store in a cool, dry, dark area free from insects and rodents. Yields per acre can vary drastically depending on production method and location, but generally range from 800 to 3,000 pounds of dried root per acre.

Marketing and Economics

Regulations for Selling

As previously mentioned, in December of 2010, goldenseal was delisted from the Endangered Species list in North Carolina. Since it is still on the CITES list, a CITES permit or certificate must be obtained before exporting cultivated or wild-collected goldenseal roots. Finished products, e.g., extracts or capsules, are not regulated. To obtain the required permits or certificates to export cultivated material, proof that the roots, rhizomes, or seeds came from legally acquired parental stock is required, as well as verification that plants were cultivated for at least four years. For permit applications and more information, contact the Division of Management Authority, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 212, Arlington, VA 22203. Telephone number is 1-800-358-2104 and website address is http://international.fws.gov.

Annual Consumption and Dollar Value

In 2005, approximately 84,000 pounds of goldenseal root were traded on world markets, almost a 50% increase from 2003, but close to a 60% decline from consumption levels in 2001. In 2005, the dollar value of consumption was around $2 million.

Supply and Demand

Demand continues to exceed supply for high-quality cultivated goldenseal. Wild harvested product is currently meeting the demand requirements of buyers more concerned with the name recognition than bioactive components. Cultivated material represented about 40% of the overall supply in 2005.

Restrictions on wild harvesting in many areas and the desire for higher concentrations of bioactive components continue to drive demand higher for high-quality cultivated material. Many manufacturers are incorporating goldenseal into other herbal products in the belief that it enhances the potency of other herbs. The publication of positive research reports on the efficacy of goldenseal should continue to drive demand. Over the next three-to-five years, the market for all goldenseal is expected to grow at a rate of 5% to 10% percent annually. The market demand for high-quality, cultivated material is expected to grow at a faster rate, approaching 10% to 15% annually.

Pricing

Prices for wild harvested goldenseal root fluctuate significantly from harvest season to harvest season. The price of cultivated product changes less, but trades in a higher price range. At the time of this writing, collectors were selling wild harvested material to dealers for $20-$25 per pound of dried root, while growers were selling cultivated material to the same buyers for about $30-$35 per pound of dried root. Wholesalers were selling goldenseal for about $67 per dried pound and the retail price was averaging about $115 per dried pound.

Distribution Channels

Customer concentration in this market is highly fragmented. Small-scale collectors, mostly in the southern regions of the Appalachian range and Missouri, supply almost all of the wild harvested material. Cultivated sources are located mainly on small acreage plots in Canada, Wisconsin, and the Pacific Northwest. Many growers of goldenseal are members of co-ops or vertically integrated into large processors.

Distribution channels are specialized and rely on experienced goldenseal brokers and professionals to bring small growers, collectors, and buyers together. Wild harvested material is handled through established general brokers that warehouse goldenseal and send it to large (mostly European) processors.

Commercial Visibility

Goldenseal has a long, established track record of medicinal use in North America. High levels of total alkaloids in this material are of extreme importance to buyers in the North American market. Bioactive content of 3% hydrastine and 6% total alkaloids is considered acceptable for most buyers.

Source: Gaia Herbs

Source: Herb Pharm

Because of its multi-faceted effect on the body, goldenseal is often seen in combination formulas, particularly with Echinacea, working together to produce the desired results.

Interest in the European market continues to steadily increase as this material has been combined with better-established herbs such as Echinacea(s) and black cohosh. Of the top nutraceutical/botanical companies, 29% offer this material as a stand-alone product and 51% offer this material as either a stand-alone product or as part of a multi-constituent supplement.

Conclusion

The forests of Western North Carolina offer good conditions for goldenseal to grow. However, the high demand for this medicinal plant has put native populations in serious decline. A CITES permit is required in order to export goldenseal.

Commercial interest in this product has been high and is expected to remain so. Goldenseal trades at a higher price bracket than most plants. In recent years, more efforts have been made to encourage farmers to cultivate this high value crop. With more cultivation efforts occurring, supply will slowly increase but not at a rate consistent with demand, which should keep prices in a relatively high bracket.

Resources

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