

Researchers investigating status of goldenseal in Pennsylvania

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One of just three plants listed as vulnerable in Pennsylvania, goldenseal is known to have antimicrobial, anticancer and immune-stimulant properties, and the herbal industry incorporates it in formulations used to treat numerous ailments. Credit: Penn State

Funded by a \$50,000 grant from the state Department of Conservation

and Natural Resources, researchers in Penn State's College of Agricultural Sciences are conducting an 18-month study of the forest herb goldenseal (*Hydrastis canadensis*) in Pennsylvania.

Goldenseal is one of just two Keystone State plants included in Appendix 2 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (the other is ginseng), and one of only three plants listed as vulnerable by the state (the others are ginseng and yellow lady's slipper). The species was used for centuries by Native Americans for overall health, and goldenseal "root" has become popular with herbalists for its purported antibiotic and antifungal properties.

But not much is known about the plant's prevalence, distribution and properties in forests across the Commonwealth, according to lead researcher Grady Zuiderveen, a doctoral degree candidate in the Department of Ecosystem Science and Management. The Michigan native is working under the guidance of botanist Eric Burkhart, faculty instructor, who also directs the plant science program at Penn State's Shaver's Creek Environmental Center; and Mike Jacobson, professor of forest resources. Burkhart and Jacobson are experts in the field of nontimber forest products.

Although the scientific evidence is limited, there are many purported uses for goldenseal, Zuiderveen pointed out. These include easing symptoms of the common cold and of digestive disorders, such as colitis, diarrhea and constipation. Goldenseal also is thought to be useful when applied topically to treat such skin conditions as rashes, infections, eczema, acne and cold sores. The plant is known to have antimicrobial, anticancer and immune-stimulant properties, and the herbal industry incorporates it in formulations used to treat numerous ailments.



The researchers will examine goldenseal root chemistry for three major alkaloid constituents in relation to habitat traits such as soil chemistry, elevation, forest type and moisture levels to identify any key differences between alkaloid content and habitat variables. Credit: Penn State

"Relatively little is known about goldenseal, compared to ginseng, and so we are looking to answer questions like, when is goldenseal most medicinally potent for harvesting, and do different growing conditions affect the alkaloids that are considered to be the medicinal constituents of the plant," he said. "In the medical community, there are mixed reviews on the efficacy of goldenseal—likely because there is no standardized practice for harvesting and drying of the plant's rhizomes."

Zuiderveen, an ethnobotanist who studies how humans use [plants](#), also received a College of Agricultural Sciences Graduate Student Competitive Grant to carry out a sub-study looking at the effects of different drying temperatures on alkaloid content.

The Pennsylvania Department of Conservation and Natural Resources is concerned that the plant may be in decline due to habitat deterioration or commercial exploitation for medicinal markets, Zuiderveen noted. The department funded the study for two reasons: to determine the plant's status in the wild and to help the forest-based cultivation industry—known as agroforestry—because results will provide guidance for optimal planting locations and harvest timing for growing a high-quality product.

"Because goldenseal is a vulnerable plant, we need to make sure it's not rare because of overharvest," he said. "But we don't really know who is harvesting it and at what levels. And honestly, it may not really be in decline—it may never have been more common in Pennsylvania."



There is no information about export of goldenseal from Pennsylvania and little information about export out of the United States. But unlike ginseng, there is little to no demand on the Asian market, so prices have stayed low. Credit: Penn State

To better determine the range of this species in the state, the research team is locating historic and current known populations of goldenseal and collecting data on each population and its associated geographic and habitat conditions. Researchers then will use the data gathered to build predictive models to identify likely sites and conduct surveys in counties where goldenseal appears to be artificially "absent."

The researchers also will examine goldenseal root chemistry for three major alkaloid constituents—berberine, hydrastine and canadine—in

relation to habitat traits such as soil chemistry, elevation, forest type and moisture levels, to identify any key differences between alkaloid content and habitat variables. The effect of harvest timing on the alkaloid constituents also will be assessed.

"In addition, we'll examine these constituents in the aboveground parts of the plant at each harvest date to determine how levels compare with those in the rhizomes," Zuiderveen said. "These results could help to generate support for using the tops of this plant either in addition to the roots, or possibly as a more sustainable substitute for the roots."

There is no information about export of goldenseal from Pennsylvania and little information about export out of the United States. But unlike ginseng, Zuiderveen said, there is little to no demand on the Asian market, so prices have stayed low. Many of the same people who collect ginseng also may be collecting goldenseal, but to a lesser degree because the plant is not deemed as valuable, he explained.

Provided by Pennsylvania State University

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