Proceedings of:

Forest farming of non-timber forest products in eastern North America: connecting growers, collectors, and researchers

April 25 and 26, 2008

A partnership between:

Shaver's Creek Environmental Center
Petersburg, Pennsylvania
www.ShaversCreek.org

Rural Action
Trimble, Ohio
www.ruralaction.org

The United States Department of Agriculture Sustainable Agriculture Research and Education (USDA SARE) Program
www.sare.org

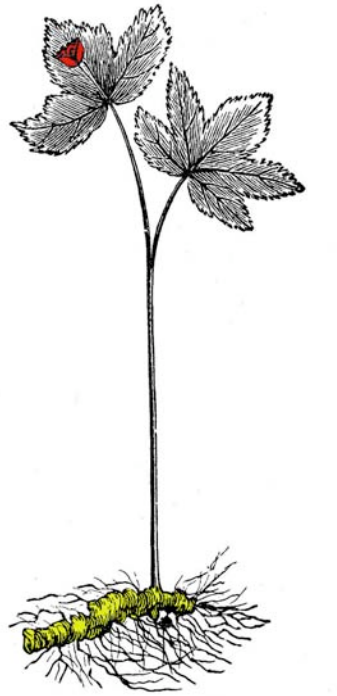
PREFACE

The purpose of this event was to bring together experienced growers, planters, collectors, and researchers of non-timber forest products (NTFPs) to discuss research findings and experiences relating to production and marketing of important NTFPs. Our organizing theme was to encourage interaction and discussion that might contribute to ecologically, economically, and socially sustainable cultivation (i.e., *forest farming*) of NTFP's on eastern North American forestlands.

Thirty-five growers, collectors, and market buyers attended from Pennsylvania, Ohio, West Virginia, New York, Virginia, Maryland, and Maine. Most had been involved with the NTFP trade for at least 10 years, and many had more than 40 years of experience. The range of products discussed included American ginseng, goldenseal, black cohosh, blue cohosh, bloodroot, false unicorn root, paw paw, maple syrup, mushrooms, and wild seeds. Most attendees reported receiving part-time income from their involvement in the industry, but several reported that they earned most or all of their income from non-timber forest products (primarily through ginseng and goldenseal cultivation).

Over two days, attendees heard from thirteen speakers on a wide variety of topics related to NTFP's, including cultivation and husbandry practices for forest and artificial shade production, with attendees encouraged to respond to what they heard from speakers. Summaries of the more involved discussions that resulted are contained in the "facilitated discussions" portion of these proceedings.

The bulk of these proceedings are comprised of presentation summaries that were prepared by speakers. These summaries do not aim to capture all that was said by each speaker, but provide an account of the main ideas and points that were shared.



Many attendees commented that these types of events are needed throughout eastern North America to help the NTFP and forest farming industries develop and mature in a recognized and sustainable fashion. Thanks are due to the United States Department of Agriculture (USDA) Sustainable Agriculture Research and Education (SARE) Program, which provided the financial support to make this event happen.

Eric Burkhart, event co-organizer and proceedings editor
July 2008

THE EVENT IN REVIEW: DAY 1

FRIDAY, APRIL 25, 2008

INTRODUCTORY TALK:

▪ **An overview of non-timber forest products and forest farming in Eastern North America**

Jim Chamberlain, Virginia

SESSION TOPIC: AMERICAN GINSENG

▪ **Forest production practices: veteran perspective**

Scott Persons, North Carolina
Andy Hankins, Virginia

▪ **Growing site selection: regional experiences, perspective and research.**

Bob Beyfuss, New York
Fred Hays, West Virginia
Chip Carroll, Ohio
Eric Burkhart, Pennsylvania

▪ **Perspectives on ginseng theft and poaching issues.**

Randi Pokladnik, Ohio

▪ **History and status of the Pennsylvania ginseng industry.**

Eric Burkhart, Pennsylvania

THE EVENT IN REVIEW: DAY 2

SATURDAY, APRIL 26, 2008

SESSION TOPIC: GOLDENSEAL, BLACK COHOSH, AND OTHER NATIVE MEDCIINAL FOREST PLANTS

▪ **Research updates from North Carolina**

Jeanine Davis, North Carolina

▪ **Grower perspective from Canada**

John Kershaw, Ontario, Canada

SESSION TOPIC: ECONOMICS, MARKETING, AND PRODUCT HANDLING

▪ **From grower to urban practitioner: experiences with direct marketing of herbs used in Traditional Chinese Medicine.**

Jean Giblette, New York

▪ **Medicinal plants and current good manufacturing practices.**

Sarah Schober, North Carolina

SESSION TOPIC: THE FUTURE OF THE INDUSTRY AND EMERGING ISSUES

▪ **Thinking beyond regulation: the importance of "carrots" in sustainable NTFP management.**

Rebecca McLain, Oregon

▪ **An overview of state/federal ginseng regulations affecting growers.**

Chip Carroll, Ohio

▪ **Grower certification program: West Virginia.**

Fred Hays, West Virginia

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FOREST PRODUCTION PRACTICES:
A VETERAN'S PERSPECTIVE
(What's Changed, What Hasn't, What's Next)

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I have been asked to look at the production of American ginseng in its native forest environment from the perspective of my nearly thirty years of woodland 'sang farming. I'll present my observations under three topics: What's Changed; What Hasn't Changed; and What's Next. There will be no attempt to be all-inclusive within any of these headings – only to discuss what is most interesting and important in going forward.

What's Changed

Price

The price paid for wild American ginseng roots has been trending upward ever since a market first developed in the early years of the 18th century. At that time, French and English fur traders began paying members of the Iroquois Nation throughout the northeast (as well as in southern Canada) to forage wild 'sang. The traders paid the Native Americans about 25 cents per dried pound, which was not small change in the 1700's (The roots eventually netted $5/lb overseas). Over the intervening 285 years, the relative value of ginseng has generally kept up with inflation, but fluctuating supply and demand has created significant aberrations for short periods of time – including the dramatic one that seems to be occurring now.

In 1978, when I sold wild-dug 'sang for the first time to a local buyer near my home town of Tuckasegee, NC, I received $80/lb. Taking inflation into account, the Iroquois got better value for their harvest than I did. Wild ginseng has always been a highly valued commodity, and wild populations have always been under harvest pressure.

The table on the following page presents the range of prices paid for both wild (on which the prices for woods-grown 'sang are based) and field-grown American ginseng during each buying season, beginning in 1982 (when I began keeping close track of the market). Several trends are evident from the table: (1) between 1982 and 1994, the price of wild 'sang gradually rose, slightly outpacing inflation: (2) between 1994 and 2005, wild prices stagnated – with the bulk of wild root, including that dug in North Carolina, Ohio, and southern Pennsylvania, bringing about $350/lb. This came as a result of dramatically increased production of field-grown roots, the subsequent dramatic drop in prices paid for those low-grade roots, and the reluctance of even the upscale consumers in the Pacific Basin to pay too great a premium for hi-grade roots; and (3) beginning in 2006, the value of wild 'sang started to rise again. As you are all well aware, that rise accelerated in 2007 at a rate far exceeding inflation. (The present, historically

unprecedented, prices ranging from $800-$1200/lb -- if they continue – will change behaviors, and I will discuss those potential changes under **What's Next**.)

TABLE 1

Recent Prices for Wild and for Field-cultivated Ginseng

Year	Wild	Field-cultivated
1982–83	$133–152	$36–51
1983–84	$137–220	$32–49
1984–85	$143–171	$24–48
1985–86	$125–152	$20–36
1986–87	$118–160	$18–30
1987–88	$180–225	$28–52
1988–89	$225–315	$30–67
1989–90	$200–270	$28–45
1990–91	$220–270	$38–62
1991–92	$220–340	$40–65
1992–93	$210–350	$28–56
1993–94	$210–310	$28–43
1994–95	$225–375	$18–30
1995–96	$400–500	$18–30
1996–97	$260–425	$10–30
1997–98	$190–425	$6–18
1998–99	$240–360	$7–20
1999–00	$305–575	$12–18
2000–01	$320–500	$13–20
2001–02*	$220–400	$12–17
2002–03	$250–500	$14–32
2003–04	$300–400	$18–32
2004-05	$250-500	$18-30
2005-06	$300-600	$14-20

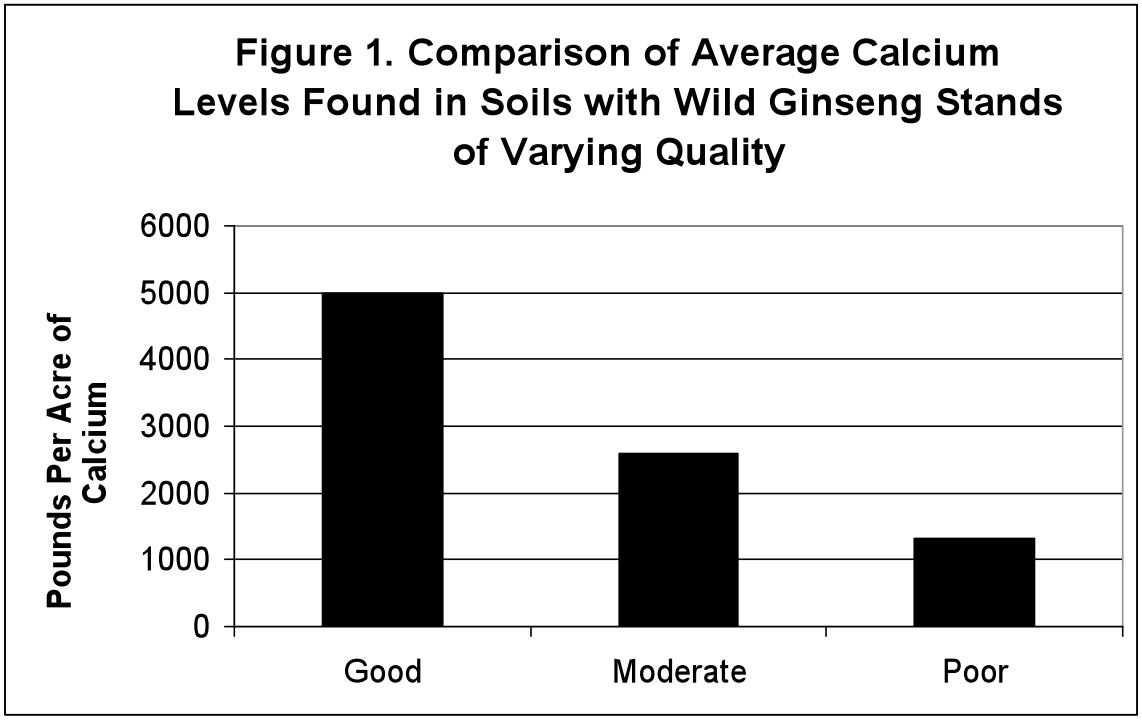
** For several weeks in the fall of 2001, immediately after 9/11, no one was willing to buy roots for export, and it was virtually impossible to sell any ginseng at any price.*

Woods-cultivated Production Practices

As a result of the drop in the price of field-grown roots – beginning in 1994 and continuing into the present – woods growers have had to sell to a more discriminating market. For example, roots such as those that I grew just as big and fast as I could for four years in intensively cultivated woodland gardens and then sold in 1992 for $75/lb, have been worth no more than $25/lb since 1994 (which is below the costs of production for a small-scale forest operation). As a direct consequence of this change in the market, woods-cultivated growers (yours truly included) have had to change their production practices – aiming for quality rather than quantity – in order to make a profit. Forest cultivation has been adjusted to slow the rate of root growth and lengthen the time to harvest to at least six years, more often seven to ten. By growing much longer, and somewhat slower, woods-cultivated growers have usually been able to produce roots clearly distinguishable from field-grown roots, thereby obtaining prices ranging from 30 percent to 75 percent of the going wild price and increasing their profit. However, the added growing years also add considerable labor and risk. It seems there are now fewer woods-cultivated growers (and probably more wild-simulated growers) – though there is no good documentation of the trend.

The Importance of Calcium Discovered

In the late 1990's, two independent studies – one by Bob Beyfuss in New York and the other by Jim Corbin in North Carolina (see the figure below) – provided compelling evidence that wild 'sang grows much better (that is, bigger and healthier) in soils having a relatively high level of the nutrient calcium (Ca).



The same studies also both found that no other nutrient is of critical importance to wild 'sang. As a result of this research, potential forest farmers are better able to select their planting site by testing their woodland soils for Ca. Moreover, growers who find they possess only marginal woodlots for ginseng now have a reasonable chance to succeed in profitably producing ginseng by adding Ca to their soils – preferably in the form of gypsum (calcium sulfate), which does not disrupt soil chemistry.

Seed-borne Disease

In recent years, I've observed an increase in seed-borne diseases affecting forest growers (though, again, there is no documentation to substantiate my observations). There has always been concern that fungal diseases in one ginseng planting can be carried to another planting, even cross-continent, on the outside of seed husks. For that reason, growers have been well advised to soak their purchased seed in a solution of bleach (or formaldehyde). However, over the last fifteen years research from Canada has clearly demonstrated that a number of fungal diseases can also be carried within the seed kernel, where a bleach solution will not kill them. Fungal pathogens are commonly present in ginseng plantings and, unfortunately, are often quite abundant in the large-scale open-field gardens grown under artificial shade, from which the majority of each year's seed are now purchased. If one of those pathogens is present on the ginseng flower as it develops into a seed-bearing berry, then the fungus can infect the seed, the plant produced by that seed, and, eventually, the new planting site.

Seed-borne Rust

The problem of rusty root also seems to have become more common in recent years, but, again, there is no hard data to verify this. (You'll note a recurring theme here.) Bob Beyfuss has written a paper explaining why he, and others, think that plants grown in the hot, arid shade gardens of British Columbia (BC), Canada, have evolved an increased susceptibility to rusty root in association with an adaptation to their stressful growing environment. This increased susceptibility, now incorporated into the gene pool of the BC ginseng plant population, has probably been spread as BC seed was picked, stratified, and sold throughout North America. When a woodland planting containing the BC strain is subjected to stress, the rust shows up on the roots, substantially reducing (even eliminating) their value (I'll return to seed issues in my last section).

Foreign Forest Farming

A less threatening change that has occurred over the last 30 years is the cultivation of American ginseng in forest far distant from our own woodlands. Would-be woods growers in widely dispersed locations like New Zealand, Croatia, Germany, Chile, Ecuador, and both Tasmania and Australia, have had at least tentative success producing high-quality ginseng. None of these operations are on a scale that threatens to inflate supply for the foreseeable future. Writings from the Korean Ginseng Research Institute suggest at least a budding interest in the profitability of growing high-quality ginseng (probably Asian ginseng, initially) in forest plantings. Should the South Koreans, with their centuries of experience, their sophisticated knowledge of ginseng horticulture, and the considerable support of their government, begin growing ginseng on a

meaningful scale in the woods, that could in time certainly affect the economics of American ginseng forest farming. It is something to keep an eye on in the future.

Interest in Ginsengs' Culture

The woodland ginseng industry – diggers, dealers, and growers – has been largely hidden to the American public in recent decades and, therefore, has not had a public voice or a political constituency. We could use better public relations, especially if we are confronted again by more unjustified, onerous regulation, like the ten-year rule that U.S. Fish and Wildlife Services (USFW) attempted to impose recently.

I had never seen anything of any length describing, either positively or negatively, the people and culture of our industry, until 2005 when two commercial books (Ginseng Dreams and Ginseng, The Devine Roots by Kristin Johannsen and David A. Taylor respectively) were published a few months apart. Neither book is about ginseng's medicinal properties or its commercial value. Rather, both narratives are about the world of American ginseng, particularly its culture as represented by a selection of individuals who inhabit different parts of that world. That successful authors and publishers with a profit motive believe the public is sufficiently interested in our world to pay to read about it suggests that there is a potential constituency that might support our endeavors in the future, if ther are well-informed.

Acceptance by Western Science

When I was writing my first book in 1985, I could find no scientists in the United States who were investigating the medicinal effects of American ginseng in a way that could be published in a first-rate, peer-reviewed professional scientific journal. However, that has changed recently. There is now a small, but growing, cadre of scientists in respected American institutions who are looking at American ginseng's medical potential.

Those of you who receive my annual newsletter (on the back of my Price List of planting stock) know of Dr. Laura Murphy's ongoing work at the Southern Illinois School of Medicine, which first demonstrated that mice fed whole-ginseng extract had four times as much tumor necrosis factor (TNF) throughout all the tissues of their body within four weeks of consumptio. Then, having obtained these results in mice, Dr. Murphy "fed" ginseng extract to *human* gut immune cells in Petri dishes. After the gut immune cells had time to secrete TNF (and many other compounds), she introduced some of those secretions into Petri dishes with *human* breast cancer or colon cancer cells. Consistently, within 24 hours, the *human* cancer cells were dead!

Dr. Murphy informs me that additional papers – from her own research group and other scientists at American institutions – are in the pipeline. With each published study, acceptance of American ginseng as a legitimate subject of study by western scientists increases.Tthis is a positive change that eventually should add value to American ginseng.

What Hasn't Changed

High Failure Rate

You might think – given the value of high-grade woods-grown ginseng – that there would be an increasing number of woods growers and an increasing quantity of high-grade roots produced. If that were true, then it would increase supply, reduce (or at least restrain) the price of wild 'sang, and take pressure off the wild populations. Unfortunately, it seems that, at least in recent years, for every new woods grower getting started, there has been an old one quitting or retiring. Although, once again, I have no hard data with which to document and support my "veteran's perspective," there is little doubt in my mind that there continues to be a high failure rate among woodland 'sang growers.

Ever since I wrote Green Gold, and thereby set myself up to be recognized as an expert, I have been getting calls from growers having difficulties. Other than an increase in seed-borne disease (and inappropriate federal regulation), the type and frequency of problems that growers report has changed little: they bring some on themselves by mismanagement; some – such as slugs, bugs, disease, drought, floods, etc. – are inflicted by Mother Nature; and then, of course, there is poaching. Regrettably, given the high price of roots and the poor economy, poaching *is* changing . . . for the worse.

Little Research on Forest Production

Other than the two calcium studies referred to earlier, and some other analysis of ideal site characteristics, there has been almost no research on forest ginseng production since the early 1900's. Woods growers have benefited from the pesticide work done for artificial-shade farmers, but the woodland environment is too different for most studies done on plants growing in open fields to prove very useful. More importantly, obvious questions remain unstudied and unanswered because researchers who are interested in woodland production have not been able to get funding, which is at least partly because the value (not to mention the potential value) of woods-grown ginseng is essentially undocumented. This lack of research goes hand in hand with the failure to reduce the rate of failure.

What's Next

In conclusion, I'd like to briefly discuss the implications of some of the changes and non-changes discussed earlier and then to suggest a few directions towards which we might be able to nudge our industry.

Behavior Changes

Every ginseng buyer that I have talked to this spring anticipates that the unprecedented high values that wild and high-quality woods-grown American ginseng brought this past season will continue to be offered, at least through the beginning of the Fall'08 buying season. If they are correct – and that's certainly not a given, but buyers tend to be conservative – then a new pricing plateau may have been reached . . . and that will have consequences.

Increased Poaching: If prices averaging above $800 per dried pound continue to be sustained for wild ‘sang while the U S economy continues to struggle, behaviors will almost certainly change in response. As mentioned earlier, poaching will increase because the risk of getting caught has not gone up, while the potential gain from poaching has increased.

Increased Foraging: A second behavior that will become more common is foraging for wild ginseng. At the end of last year’s digging season, when root prices had matched and then far exceeded their historical highs, many young, hard-working, normally reliable men in my community took days off work to go ‘sang digging. Some spent long weekends camping in remote forested areas. They expected that they would make a great deal more money digging wild ‘sang than they could painting, or laying rocks, or working construction, or teaching school. I know that at least some of them had their expectations fulfilled. If the price of ‘sang stays high, they will be in the woods during the week again next fall.

I’ve never thought that our wild ginseng population was at long-term risk from ‘sang diggers. Historically, ‘sang has always been under foraging pressure because ‘sang has always been of considerable value. For the most part, diggers (particularly those to whom the tradition has been passed on by an older family member) harvest in a sustainable manner, planting berries as they dig mature roots. The value of roots right now is qualitatively different, however, and therefore so is the potential pressure on wild populations if the prices don’t fall. Timbering and development continue to reduce wild population. If an excessive number of diggers (many of them not brought up in the tradition of sustainable harvest) spend an excessive number of hours in the woods, then areas will be thoroughly scoured. Moreover, the high per-pound price means it’s cost effective to spend time digging smaller roots. In time, the wild populations may indeed be put in real jeopardy, perhaps for the first time since ‘sang became an export commodity 285 years ago.

Should the USFW’s Office of Scientific Authority determine that the wild populations are in danger, then the USFW’s Office of Management Authority will likely curtail the digging and exporting of wild ginseng. Furthermore, since it is virtually impossible to distinguish high-grade woods-grown roots from ‘wild’ roots, the USFW may banthe export of woods-grown ‘sang as well, reasoning that poachers of wild roots will either impersonate wild-simulated growers, or even sell their illegally collected roots to a woods grower for export. The only way to effectively prohibit this would be to disallow the export of woods-grown roots along with wild ones. The USFW is not obligated to consider the economic hardship that such an action would impose on diggers, dealers, and growers, or the centuries-old culture it would destroy.

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Thus, I am a ‘sang grower who actually wants the price of the high-grade roots that I grow to go *down*. I certainly can make a good profit if wild (and wild-simulated) prices are at, say, $450/lb -- a price that would send most folks back to work during the week, and take the pressure off of wild populations.

Increased Woodland Planting: Fortunately, at least from my perspective, there will be factors operating over time to bring prices down, because more folks are going to be planting ginseng in the woods. My seed sales are already far above any previous years. Whether it is an accurate perception or not, people think that current prices are likely to continue (or even continue to

rise), making growing ginseng appear more attractive than ever before. More 'sang will be planted and, in time, an increased supply of high-grade roots will better match demand. Root prices should then start to fall.

However, in the meantime woods growers should try to take the pressure off of wild plants by initiating and supporting efforts to develop sources of ginseng seed from wild populations that have had a minimum of exposure to the gene pool of field-cultivated plants. If growers will develop such seed sources by growing isolated gardens of 'wild' plants primarily to produce seed, not only will they have better seed to plant and sell, but government botanists might also be persuaded that the restoration of ginseng by re-seeding into the woods is an acceptable and practical method for protecting wild populations. Seed-borne disease problems, particularly rusty root, could also be reduced by planting seed originating from wild populations and grown in its native forest environment.

Research Like Other Crops

Finally, woods growers would greatly benefit from simple research**.** The calcium studies are an excellent example of the valuable knowledge that can be gained if basic questions about woodland production – the low hanging fruit, so to speak – were addressed by interested plant scientists. Other crops, many of less economic importance than ginseng, regularly have such research funded.

Documentation: The information that woods growers need may have to be gathered within the 'sang communities. To obtain horticulture research funding, it would be extremely helpful if there were documentation of how many folks there are out there in the woods producing how many dollars worth of roots for export each year. It would be useful to look at their success/failure rate as well. Such information would demonstrate a constituency and a need for research, lending considerably more legitimacy to our endeavors, and providing baseline data. Subsequent to this documentation of our existence and significance, there are many potential research questions that might gain funding, and would likely provide helpful information to woods growers. Two areas, where the fruit is likely to be hanging the lowest, are optimal Ca applications and the forest soil ecology associated with ginseng roots.

Calcium Application: We already know that Ca is critical for native ginseng's vigorous growth and health. What we don't know is how and when, and how often and how much Ca should best be applied. That is, we don't know the research-based guidelines for Ca soil amendment and optimal CA levels in the woods. The answers to such questions will require multiple years of study, but the cost/benefit ratio seems to be quite high, since the knowledge gained would almost certainly increase success rates amongst woods-growers.

Forest Soil Ecology and Ginseng: With respect to other crops, there has been a recent increase in the useful understanding of how soil ecology influences plant growth and survival. It's likely that ginseng, an ancient plant that's evolved over millions of years to live in forest ecosystems, is greatly affected by the micro-organisms that inhabit such soil. Critical interactions and symbiotic relationships almost certainly exist between the ginseng root and the micro-organisms – fungi, bacteria, micro-arthropods, mycorrhizi, etc. – that share its environment. Since nutrients (other

than Ca) do not greatly influence ginseng's health and growth, it is logical to look next at the effects of soil micro-organisms in order to improve our forest production practices.

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About the speaker

Scott Persons was born in Durham, North Carolina. He graduated from Duke University in 1967 with a B.A. degree in Philosophy, and then went on to earn M.A. and Ph.D. degrees in Educational Psychology from Emory University. When marriage led him to settle in western North Carolina, Dr. Persons became fascinated with the valuable woodland herb that flourished on the heavily forested hillsides of his new wife's homestead. Established in 1979, his Tuckasegee Valley Ginseng Farm has not only supported his family but also supplied planting stock (and often advice and council as well) to ginseng farmers all over the country . . . indeed, all over the world. His first book, American Ginseng: Green Gold, guided woodland ginseng growers from Alberta to Tasmania for over twenty years. His second book, Growing and Marketing Ginseng, Goldenseal & Other Woodland Medicinals, which he co-authored in 2005 with Dr. Jeanine Davis of North Carolina State University, is recognized as the authoritative source for practical information on the production and sale of profitable woodland herbs.

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ADDING VALUE TO WOODLANDS WITH AMERICAN GINSENG

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A Virginia Cooperative Extension program called "Adding Value to Woodlands with American Ginseng" began in Virginia in 1987. This program was developed by Andy Hankins, Extension Specialist-Alternative Agriculture at Virginia State University in Petersburg. In the last twenty years, he has increased woodland production of American ginseng throughout Virginia by using the following Extension methods:

1. Establishment of Extension research demonstration plots in privately owned woodlands.
2. Ginseng conferences and ginseng field meetings.
3. Individual consultations with landowners concerning American ginseng production and marketing.
4. Media releases including newspaper articles, radio presentations and television presentations.

As an Extension Specialist with 100 percent extension appointment, Andy has not conducted scientific research studies concerning ginseng. His work concerning ginseng is focused on outreach to Virginia landowners. He has developed Extension research demonstrations to try to answer very basic questions concerning ginseng production in Virginia. These questions include:

1. Can the wild-simulated method of growing American ginseng enable Virginia landowners to establish naturalized populations of ginseng in their privately owned woodlands?
2. Can American ginseng be grown in the mountain, piedmont and tidewater regions of Virginia, using the wild-simulated ginseng production method?
3. How many pounds of dried roots of ginseng can a landowner expect to harvest from each pound of seeds planted, when using the wild-simulated ginseng production method?

When Andy first began work as an Extension Specialist at Virginia State University in 1987 he knew that he wanted to learn more about growing ginseng. In August of that year he made an appointment to meet with Dr. Tom Konsler, an Extension Vegetable Production Specialist with North Carolina State University at the Mountain Horticulture Research and Extension Center in Fletcher, North Carolina.

Dr. Konsler shared a great deal of his research findings concerning ginseng with Andy. He also introduced him to Scott Persons, a local ginseng grower and ginseng seed producer who had just

finished writing a book called American Ginseng: Green Gold. Andy started buying ginseng seeds from Scott Persons at Tuckasegee Valley Ginseng to develop extension research and demonstration plots in Virginia.

Wild-simulated ginseng production was a very new term in 1987. It meant that stratified ginseng seeds from cultivated sources should be planted on the forest floor with a minimal amount of soil disturbance and allowed to grow without direct care. At that time, no particular system had been established to plant ginseng seeds for wild-simulated production which forced Andy to develop his own system.

He began by planting stratified ginseng seeds in October and November on north, east or northeast facing slopes under hardwood trees. Andy wanted to test wild-simulated ginseng production at many different sites, so his plan for demonstration plots at each selected site involved the planting of four ounces of stratified ginseng seeds. Using a leaf rake, he would first sweep leaves away from a section of forest floor that was five feet wide and fifty feet long. Using a mattock, Andy made three shallow furrows down the length of each section. These planting rows were spaced 18 inches apart. In each furrow, he placed seeds by hand three inches apart and covered them with ¾ inch of soil. After planting, he would always walk down each planted row to firm the soil around the seed. The last step involved raking leaves about four inches of leaves back over the planted section to serve as protective mulch.

One ounce of seeds was used to plant each of these 250 square foot plots. Andy's standard demonstration at each site was four plots, and he marked the corners of these planted sections with wire flags. These woodland demonstrations could be planted in two to four hours depending on how much additional labor was available. In this wild-simulated ginseng production system, after planting, no further work was done. The young plants came up the next spring and were left alone to live or die for the next ten to twelve years. The goal was to establish a naturalized stand of ginseng on the forest floor. Damaging effects of weeds, insects, diseases, drought, wildlife, etc. were not controlled. The plants were allowed to grow wild and the roots that were eventually harvested to be sold as wild roots.

Every year,from 1987 to 1999, Andy planted three pounds of ginseng seeds in privately owned woods throughout Virginia with many different landowners. He usually established twelve demonstrations each fall. His first demonstrations were planted in the Blue Ridge Mountains in sites that seemed to be ideal for ginseng production. As the years went by, he started getting requests for information about ginseng production from landowners who lived in the piedmont region of Central Virginia. Most of the land area within Virginia is located in the piedmont and tidewater regions. At first, following conventional wisdom, he told people who lived in the lower elevations that American ginseng could not possibly grow on their land. The books stated that ginseng must be grown on a cool mountain slope surrounded by indicator plants like black cohosh, bloodroot and maidenhair fern. In 1993, when prices for dried ginseng roots began to approach $400 per pound, requests for ginseng assistance from landowners outside of the mountains became so insistent that he decided to try some test plots in both the Northern Piedmont and in the Southern Piedmont regions of Virginia. He also planted a few ginseng research demonstrations in the light sandy soils found in the Tidewater region of Virginia near the Chesapeake Bay.

In February of 1988, Andy held an Extension educational meeting concerning ginseng production in Charlottesville, Virginia with Dr. Tom Konsler from North Carolina State University appearing as a guest speaker. About 80 persons attended this first program. During the years, Andy developed his own slide presentation concerning ginseng production. He spoke about ginseng to large and small audiences at local meetings throughout Virginia, and he invited Scott Persons to give presentations at several landowner conferences. Audiences were generally very pleased to finally receive comprehensive information about ginseng, although Andy did receive a few complaints from ginseng growers who believed that knowledge of ginseng should be kept secret. He was also criticized by a number of extension agents for promoting a crop that would likely be stolen before anyone could harvest it. During this period, American ginseng was receiving a fair amount of attention by the press in Virginia. One widely-read newspaper article concerned ginseng poachers being caught digging roots illegally in the Shenandoah National Park. Andy began writing articles concerning American ginseng for newsletters and newspapers that were focused on production, marketing and conservation. He also participated in development of two documentaries concerning ginseng with local television stations.

In August of 1995, Andy convened the first Wild-Simulated Ginseng Production Field Meeting at the Northern Piedmont Agriculture Research Center in Orange County, Virginia. Seeds he planted in 1987 had grown very well in privately-owned woods about four miles from that public research station. Publicity for the field meeting suggested that participants would have an opportunity to harvest wild ginseng roots, and nearly 200 people came to this educational program. Since everyone had to drive to the secret demonstration site, state police were recruited to provide traffic control. Andy learned that American ginseng can be used for successful field meetings only if some of the participants in his research program would be willing to allow the public to visit their woodland production sites. The best landowner to use for a future field meeting is an older person who will not become a committed ginseng grower. On the day of the field meeting all of the mature roots should be harvested. Any roots left behind in the woods, after such a public field meeting, are likely to "disappear". It takes some forward thinking for extension personnel to develop a field demonstration that will be presented seven to ten years later, but the years do go by quickly and live ginseng plants always create a lot of excitement.

In the Spring of 1996, Andy was invited to participate in development of a proposal to the Foreign Agricultural Service of USDA called the "China-West Virginia Ginseng Research Exchange." The proposal was approved for funding and in July of 1996, Andy traveled to China with two Extension Agents from West Virginia named John Scott and David Cooke. These three Extension personnel visited state-owned ginseng farms, university ginseng research stations and ginseng markets in five provinces of Northeast China. They had a great time learning about production of both Asian ginseng and American ginseng in China. American ginseng has been grown in China since about 1975. At one university research station in Jilin Province there were thirteen PhD level ginseng research scientists investigating every possible aspect of this valuable plant. All of the ginseng, these three visitors saw in China, was growing under artificial shade. The abundant woodlands found all over the Eastern United States do not exist in China. This single observation helped Cooke, Hankins and Scott believe that the future market for wild and wild simulated roots of American ginseng from the U. S. was secure from over production.

In 2000, Andy developed Virginia Cooperative Extension publication 354-312: "Producing and Marketing Wild Simulated Ginseng in Forest and Agro-Forestry Systems." This publication was posted on the Virginia Cooperative Extension - VCE Website. The presence of this publication on the Internet has brought a great number of inquiries to Andy from landowners all over the United States. Research and Extension personnel from several land-grant universities in the Eastern United States have published publications concerning American ginseng in recent years. Many of these university professionals also organize annual conferences concerning ginseng and other botanical herbs. Several non-government organizations like Rural Action in Ohio have also contributed a great deal to outreach education concerning American ginseng.

In August of 2005, Andy received approval for a grant proposal entitled, "Adding Value to Woodlands with American Ginseng" from the Specialty Agriculture Research Grant Research Program operated by the Virginia Department of Agriculture and Consumer Services. Andy received $26,000 to conduct a one-year educational program. He immediately purchased 200 pounds of stratified ginseng seeds and six cases of an excellent book entitled, "Growing and Marketing of Ginseng, Goldenseal and Other Woodland Medicinals," by Scott Persons and Jeanine Davis. Andy sent an e-mail message to all of the Agriculture Extension Agents in Virginia inviting them to recruit landowners to participate in this grant funded project. The idea of the project was to learn by doing. Each participant received one or two pounds of ginseng seeds in time for fall planting and a copy of the book. This was a shotgun approach to ginseng education. It is not likely that every person who received those pounds of seeds planted them carefully in a good location. Andy received a slight amount of criticism for not following through with each of these landowners. He did not have time to follow up with 160 landowners on an individual basis. Most of the Virginia Agriculture Extension Agents participating in this program have followed up with these beginner ginseng growers very well. Many of the participants in this ginseng planting program have expressed their gratitude for this assistance.

In the last four years, Virginia State University has received financial support from the Renewable Resources Extension Act (RREA) of USDA to develop educational programs concerning production of American ginseng and other woodland crops. This agency is concerned about the fragmentation of forestland throughout the United States. Real estate development has especially caused a grievous loss of forest land in Virginia. Andy used these funds to develop a number of conferences called "Income Opportunities for Woodlot Owners." At these conferences, leading experts from across the country discuss opportunities with eco-tourism, non-timber forest products and sustainable forestry practices. Andy has used RREA funds to bring leading experts in production and marketing of American ginseng and goldenseal to Virginia. He has also used funds from RREA-USDA for further ginseng seed purchases and goldenseal root purchases. The seeds and planting roots were used to develop more field demonstrations with private landowners.

American ginseng is currently grown on over 600 privately-owned woodlots in Virginia. Nearly all of these landowners use the wild-simulated method of growing ginseng. These naturalized populations of ginseng are growing throughout the mountains and throughout the Northern Piedmont Counties in carefully selected sites. Naturalized populations of ginseng are also growing quite well in certain micro-environments throughout the Southern Piedmont region of Virginia. American ginseng certainly does not grow well in the Tidewater region of Virginia.

Andy Hankins believes that privately owned forestland which is used for production of American ginseng is less likely to be sold for development than forestland which does not contain valuable herbaceous crops. He would like to encourage other professionals who work in agriculture and forestry to join in this effort to protect our forests by adding value to woodlands with American ginseng.

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About the speaker

Andy has served as Extension Specialist-Alternative Agriculture in Virginia since 1987. He is stationed at Virginia State University in Petersburg. He provides educational programs in production and marketing of non-traditional farm products such as medicinal herbs, garlic, cut flowers, mushrooms, specialty fruit and vegetables, exotic livestock, value-added farm products and certified organic vegetables, grains and livestock. He also provides educational programs concerning development of agricultural tourism in Virginia. Andy grew up on a 27 acre farm in Bedford County, Virginia. He received a Bachelor of Science Degree in Agriculture from Berea College in Kentucky. From 1977 to 1987, Andy served as an Agriculture Extension Agent first in King and Queen County and later in Madison County. He went back to college at Virginia Tech to receive a Masters Degree in Animal Science, before becoming a state specialist. Andy currently lives with his wife and son in New Kent County, Virginia.

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VISUAL SITE ASSESSMENT & GRADING CRITERIA FOR POTENTIAL WOODLAND GINSENG GROWING OPERATION FOR A MID-ATLANTIC FOREST

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The Visual Site Assessment (VSA) and Evaluation Tool for Prospective Woodland Ginseng Growers is a "tool" I developed to help "wanna be" ginseng growers in NY State evaluate their forested land for growing ginseng. It is based partly on the ecology of wild ginseng in its Northeastern range as well as some practical considerations for would be growers. Points are awarded for each of 6 different categories, the higher the point score, the better the chances of success.

The ecological data is based on reported observations of more than 250 wild ginseng populations by more than 25 experienced harvesters from 4 Northeastern States (NY, NJ, VT and ME). Harvesters were provided with a simple checklist of ecological factors i.e dominant tree species present, orientation, companion herbaceous plant species, and approximate slope. Harvesters were also asked to collect a soil sample from where they found the ginseng. Postage paid, self addressed envelopes were provided for mailing the soil sample and the data sheet back to me. The soil was analyzed for nutrients by the Cornell University College of Agriculture soil laboratory. I performed the routine statistical analysis of the data submitted.

Category A evaluates the dominant tree species present on site. It was obvious from the data that in the Northeast, sugar maple is by far the preeminent companion tree species for ginseng. It was listed on 100 percent of the surveys as the dominate tree species. The reasons for this are likely related to the fact that sugar maples are capable of "hydraulic lift", a rare phenomena in which individual mature sugar maples are able to bring as much as 50 gallons of water or more from deep in the soil to near the soil surface at night. The following days this deep origin ground water is available for the shallower capillary roots of the maple to re-absorb and presumably, some of that water is also available for herbaceous plants such as ginseng that are growing nearby. American ginseng is most commonly found in moist but well drained environments.

The second ecological connection to sugar maple is due to the fact that sugar maple leaves concentrate the nutrient calcium to the level of 1.75 percent of dry weight. Many deciduous tree species store cations such as calcium in leaf tissue but most withdraw the nutrients prior to leaf senescence while sugar maple leaves retain the calcium even after they fall. Analysis of the previously mentioned soil samples indicated that high levels of calcium were always associated with wild ginseng populations regardless of pH values. In fact calcium was the only nutrient that was statistically significant in the soil nutrient analysis. In some cases the levels of calcium in the soil were hundreds of times higher than would be expected by the pH values of the mineral soil alone. Independent research in TN and Western North Carolina by Jim Corbin also noted the

direct correlation between high soil calcium and healthy wild ginseng populations. Other published research by Leonard Stoltz in KY in the mid 1980's indicated that calcium was a crucial nutrient for ginseng growth.

It is interesting to note that casual surveying of much of the published ginseng literature lists oak and hickory as common tree species that ginseng is commonly found growing under. Both of these tree species are dis-indicators of ginseng habitat in the Northeast. A great deal of published data on ginseng ecology is based on regional observations that do not apply across the entire range of ginseng. Indeed, this VSA tool is designed for Northeastern hardwood forests. A VSA that is more applicable for the Mid Atlantic States and westward into Appalachia is included later on.

Bonus points are also awarded for sugar maple trees of large stature. This is because the presence of such trees usually indicates higher soil organic matter levels which is very desirable and also indicates older, less disturbed sites more likely to harbor vestiges of ancestral wild populations and possibly more established favorable mycorrhizal associations.

Declining point values for other tree species is also based on observations of wild populations and associated trees.

Category B (Exposure or orientation) is worth significantly fewer points but also tends to correlate with tree species occurrence. In upstate NY sugar maples are most often found on the cooler, somewhat moister north or northeastern facing slopes. In the much colder climate of Northern Quebec Canada, sugar maple is most often found on south facing slopes and consequently so is ginseng. Extremely rolling, hilly country which characterizes much of Appalachia may harbor ginseng in many protected locations.

Category C is slope and is based partly on ginseng ecology and partly on potential growing site considerations. In much of its range ginseng occurs on well drained hillsides, usually mid slope but it may be found growing on extreme slopes or occasionally on flat areas. Extreme slopes may offer some protection of the plants from deer predation but from a ginseng farming perspective, the hand labor required to grow ginseng on extreme slopes, greater than 25 percent, makes cultivation much more difficult. Flat sites need to have excellent drainage for good ginseng growth.

Category D Site and soil characteristics is based primarily on grower considerations. Ginseng may grow in the wild in extremely rocky sites with a great deal of vegetation present but such sites present great difficulty for preparing, planting and ultimately harvesting the crop.

Category E, understory plants, is perhaps the most important predictor of the suitability of any given site. The plants listed here are the best overall indicators of many important factors. They indicate appropriate levels of shade, adequate moisture, deer predation pressure, soil nutrient characteristics and in general, these are the historical companion plants for wild ginseng. The presence of three or more of the top rated plants is almost a guarantee that ginseng will grow on a site. Absence of these plants does not mean that ginseng will not grow on any given site due to the fact that these plants themselves may have been extirpated in a previous era. Like ginseng,

they may not have had time to re-colonize a previously disturbed site when conditions became more suitable.

Category F, security is very important for potential growers, particularly in regions where ginseng has a long history of local harvesting. Ginseng is not hard to locate by people who know the plant and its habitat characteristics. There is a difference between poaching and stealing. Poachers who would not hesitate to dig some of what appears to be a wild patch of ginseng even on posted private property, might not dig an area that was obviously planted and being activity maintained by someone, particularly if there was a good chance of being apprehended. Fencing, signage, security cameras, noise alarms and obvious human presence are the best deterrents to poaching.

Included is a similar VSA tool for the mid Atlantic States and is more reflective of Appalachian forests in general. These forests feature much higher biodiversity than the Northeast with both different and similar companion plants, tree indicator species and other site characteristics. More points are at stake for security issues since this region has a longer history of wild crafting.

Finally, it should be understood that these VSA forms are just tools that are designed to help potential growers locate suitable growing spots. Ginseng has a broad range of habitats across its native range that varies significantly, even within a single state such as PA. Previous attempts to characterize "wild" ginseng in order to develop management and protection strategies based on short term studies of limited numbers of populations within defined geographic areas have perhaps done more harm than good. Even peer reviewed research papers that have appeared in journals have failed to accurately characterize the species in all its variants and in all its habitats. Management regulations based on such limited data and short term studies need to be reconsidered or perhaps completely abandoned.

It is ironic that this fascinating plant which has survived almost 200 years of uncontrolled and unregulated harvest, loss or disturbance of much of its native habitat and significant soil and climatic atmospheric changes (acid rain and global warming) finds itself all the more threatened today as a result of its current status of being "protected."

VSA form for a mid-Atlantic forest

Note: Circle only one choice for each category

CATEGORY A - Dominant tree species (50 percent or more of mature trees)	*Points*
1. Sugar maple or Black Walnut(add additional 5 points more if average circumference is greater than 60 inches)	10
2. Yellow Poplar and White Ash (add additional 5 points more if average circumference is greater than 60 inches)	10
3. Mixed hardwoods consisting of Beech, Black Cherry, Red Maple, White Red Oak, Ironwood, Basswood, and Yellow Poplar.	7
4. Mixed hardwoods as above plus some Hemlock and/or White Pine	5
5. Red and/or White Oak	3
6. Ironwood, Birch, Hickory	1
7. All softwoods, Pine, Hemlock, Spruce, Fir, or Willow	0
CATEGORY B - Exposure (orientation)	
1. North, East, or Northeast facing	5
2. Southeast or Northwest	2
3. West, Southwest, South	0
CATEGORY C - Slope	
1. 10 percent to 35 percent slope	4
2. Level to 5 percent slope	2
3. 35 percent or greater slope	0
CATEGORY D - Soil physical characteristics	
Few stones, 75 percent tillable	10
Moderate small stones, 50 percent - 75 percent tillable	8
Very stony, 25 percent to 50 percent tillable	5
Large rock outcropping, many boulders, less than 25 percent tillable	3
Soil too rocky to till anywhere	0
CATEGORY E - Understory plants	
1. Reproducing population of wild ginseng	15
2. Sparse wild ginseng, wild ginger, black cohosh	10
3. Maindenhair fern, rattlesnake fern, wild ginger, goldenseal, lady slipper	8

4. Christmas fern, blue cohosh, red or white baneberry, wild sarsaparilla	6
5. Jack-in-the-Pulpit, other ferns, trillium bloodroot, foamflower, jewelweed, mayapple, elderberry	5
6. Virginia creeper, ground nut, wild yam	3
7. Club moss, princess pine, bunchberry	0
8. Woody shrubs such as witchhazel, viburnums, shrubby dogwoods, alder	0
9. None of the above (no ground vegetation)	0
10. Woody shrubs, spice bush, paw-paw	4
CATEGORY F - Security	
1. Very close to occupied, full-time residence of potential grower, within easy viewing of residence (noisy, outside dogs housed nearby add 5 points)	10
2. Forested land less than 50 to 100 yards from grower's residence, patrolled regularly	8
3. Remote woodlot within one quarter mile of residence, patrolled regularly	3
4. Non-resident grower, remote woodlot	0
Total Score (add points from each category):	

How to interpret the results of the VSA:

50 points or above	= Excellent site, great potential
40 to 50 points	= Good site, do complete soil analysis
30 to 40 points	= Fair site, test soil
Less than 30 points	= Poor site, look elsewhere

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About the speaker

Bob is the Agriculture and Natural Resources Program Leader for Cornell University Cooperative Extension of Greene County. He is also the NY State specialist for American Ginseng Production for Cornell University. Bob received his bachelor's degree from Rutgers University in 1973, majoring in Botany and his Master's degree in Agriculture from Cornell University in 1987. The title of his Master's Thesis is "The History, Use and Cultivation of American Ginseng". He is the author of "American Ginseng Production in NY State", "The Practical Guide to Growing Ginseng," "Ginseng Production in Woodlots," "The Economics of Woodland Ginseng Production," (both published by the USDA National Agroforestry Center) "Growing Gourmet Mushrooms from A to Z," "Companion Planting," and several other fact sheets regarding ginseng, organic gardening and mushroom growing in forested environments. Bob is an Internationally Certified Teaching Arborist. He has extensive background in media

work hosting and producing a half hour TV show for 7 years. His weekly radio gardening programs have been broadcast continuously for the past 28 years.

PERSPECTIVE ON IDENTIFYING FOREST GINSENG GROWING SITES IN WEST VIRGINIA

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We all have heard the obvious about site assessment and there is no need to overlay what Mr. Beyfuss has already presented. Therefore, I want to go over some other ways to assess ginseng-growing areas.

I have been growing a stand of ginseng in nursery cans for seven years. This began as a way to produce a seed crop and avoid damage by voles. What I have learned from this is very revealing about the most significant cause of ginseng crop loss. The area where the nursery cans are situated was also planted evenly in the soil along the same slope. After seven years, a high survival rate exists in the nursery cans while only 15 percent of the normally planted ginseng has survived. The nursery cans are an effective obstacle to damage from voles. The bottoms of these common cans have holes, but with stones for drainage are impenetrable to voles. The voles have had unrestricted access to ginseng planted in the ground along the same slope. The result of this applied study realistically suggests that voles are eating about 75 percent of ginseng planted in the forest.

Ginseng sites can be greatly enhanced by encouraging predators that eat mice. Snags for birds of prey and the use of cats along with protecting black snakes are all helpful to developing a good site.

The novice can find a good site for producing ginseng with a few simple measures. During the winter months, forested sites where the snow is last to melt are often just as good as the use of indicator plants during the growing season. Forested areas where wild raspberries grow tend to be places where ginseng will also do well. Raspberries seem to need the same rich well-drained soils as ginseng. This strategy does not include where black berries grow.

A more common way to address site selection is to simply identify where a great diversity of herbal plants grow and grow well. Large robust plants as opposed to small spindly plants are good indicators no matter what the dynamic make up of the plants may be. A more non-traditional kind of site is often just as productive and sometimes more productive than what growers have come to expect.

Understanding how community dynamics work with plants and the relationship with solar energy is key to being successful. One such successful site for me has very few of the traditional indicator plants or “’sang pointers”. Some of my best ginseng grows among Japanese stilt grass,

rag wart, and jewelweed. This works because the stilt grass is kept in check by the fast growing jewelweed, which in turn acts to keep deer from browsing the ginseng. The stilt grass and the jewelweed take up a lot of excess water and seem to keep ginseng diseases at bay.

While community dynamics are far too complicated for anyone to ever fully understand, experimentation can often yield such successes. Working with the natural environment is far more effective than attempting to overcome the natural environment such as with reductionism strategies from the past fifty years of agriculture.

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About the speaker

Fred has a Master's degree from Marshall University and is a Certified Holistic Educator. He is the Director of the Center for Sustainable Resources, District Supervisor for Capitol Conservation District, and founder of the West Virginia Ginseng Growers Association. Fred and his wife raise game-fish, livestock, trees, and woodland herbs on 150 rugged acres in West Virginia.

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RESULTS FROM PENNSYLVANIA GINSENG HABITAT RESEARCH: IDENTIFYING "INDICATORS" FOR FOREST FARMING

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Introduction

American ginseng has been documented, collected, cultivated, and/or reported from every county of Pennsylvania. Yet, there has never been any systematic investigation of ginseng habitat within the state. This information is becoming increasingly important for conservation, reintroduction, and commercial or hobby forest cultivation (a.k.a. forest farming) efforts.

Pennsylvania has a wide variety of forest types and geologic conditions that are likely to influence specific ginseng habitat "indicators." For example, the northern third of the state is dominated by the Northern hardwood forests while the southern two-thirds of the state is primarily Appalachian oak forest. Similarly, there are significant physiographic transitions that occur throughout the state, with six major physiographic recognized provinces.

This research was undertaken to systematically collect information about ginseng habitat in Pennsylvania, and determine habitat "indicators" within the state according to factors such as region, forest type and physiographic province.

Methods

Between 2002-2007, American ginseng habitat study sites were solicited from throughout the state from the public and using historical records. More than 100 sites were visited but only 54 were eventually included in this study (Figure 1). Only locations with vigorous, reproducing populations were selected for study, since the primary goal was to identify habitat supportive to ginseng growth and reproduction rather than habitats that are only marginal. The number of plants at each study location ranged from 25 to more than 1,000, with most populations being between 51-100 plants (Figure 2). Most populations were distributed over an area of 2 acres (Figure 3).

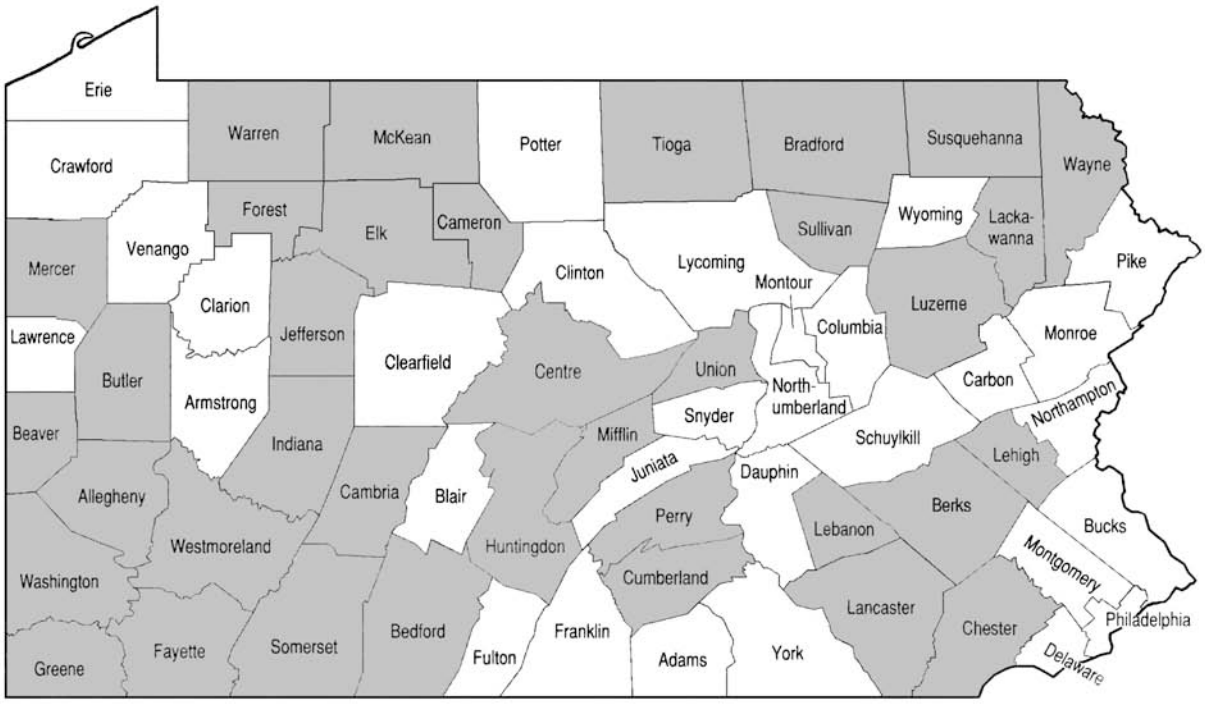

Figure 1. Counties where ginseng habitat study sites were located (n = 54).

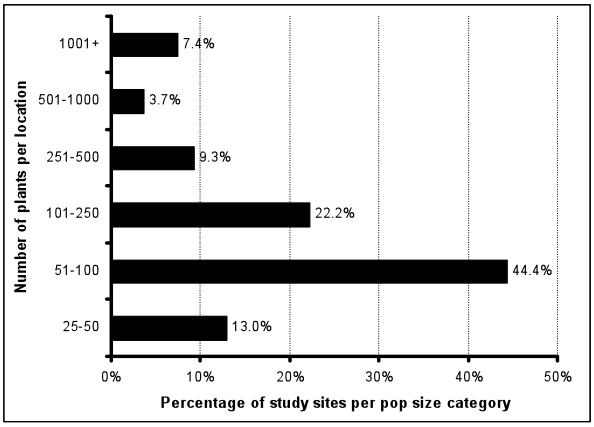

Figure 2. Population sample sizes.

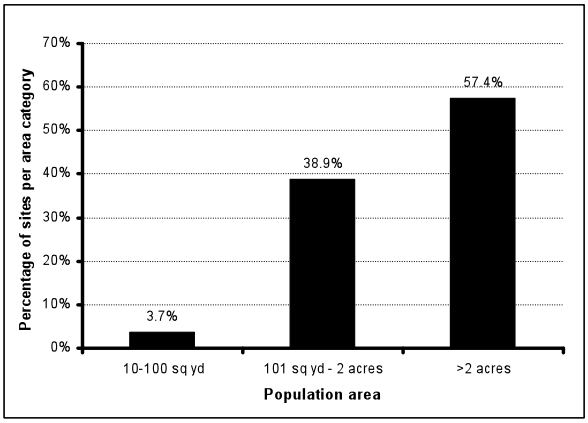

Figure 3. Population dispersion per site.

Vegetation sampling methods

To document the trees and plants at each study location, a modified version of the Point-centered Quarter-method (PCQM) method was used. It was modified in that, rather than establishing plots at random along a transect, plots were established using stratified, random selection of ginseng "clusters" or "patches" consisting of both vegetative and reproductive stage of development. This modified method was adopted to examine "nearest neighbors" to ginseng, as opposed to attempting to document the entire flora at each site.

Five circular plots, each with an area of 314 ft^2 (d = 20 ft, r = 10 ft), were used for herbaceous plant sampling. Each plots was then further divided into four quarters, for documentation of trees. Only the nearest dominant or co-dominant canopy tree (stems > 3.0 in. dbh, height > 4.5 ft) within each quarter was recorded. Distance to each tree from plot centers, as well as diameter (dbh) was also recorded. A total of 270 herbaceous sample plots and 1,100 tree plotless samples resulted.

The flora at each site was sampled at least twice between 2002-2007 during late spring-early summer and during mid- to late summer. Many sites were visited three or more times if continued sampling was necessary. At least two sampling times was used to ensure thorough documentation of different seasonal transitions.

In addition to the field data collection, a survey instrument was used to gather perspective regarding plant, shrub, and tree habitat indicators within Pennsylvania. A total of 369 people participated in this survey effort representing collectors, growers, planters, buyers, and generally interested individuals. Each participant was asked to list up to five indictors of good ginseng habitat in Pennsylvania for plants, shrubs, and trees.

Soil sampling methods

A soil auger was used to collect five soil samples (A-horizon, 0-15 cm depth) at each site. Sample locations will be selected to represent microsite differences resulting from slope position and/or location, and will be proximal to a selected vigorous individual plant. A single sample will also be collected for texture analysis. Soil pH, nutrient content, organic matter content, and texture will be determined by the Pennsylvania State Agricultural Analytical Services Laboratory, University Park, PA. Soil series information will be compiled from published soil surveys.

Physiographic features

Elevation and aspect was recorded using a hand-held GPS unit. Slope was recorded using a clinometer. All of these data, along with visual observation, were then used to assign each population into topographic position and slope categories adapted for use from a field data form used by the Pennsylvania Department of Conservation and Natural Resources (DCNR).

Results

Vegetation – trees

A total of 32 species of trees were found to be associated with ginseng across the state (Table 1). The most common tree species was sugar maple which occurred in close proximity to ginseng on ~69 percent of the research sites and ~60 percent of the research plots. This was followed by white ash, basswood, tulip-poplar and black cherry, respectively (= "top 5"). Twenty of the 32 tree species occurred on 20 percent or less of the research sites, suggesting that these may be "incidental" associates rather than indicators of habitat.

"Maple" was also the most commonly listed tree in surveys, with respondents listing it 119 times (Figure 4). While it is impossible to know which "maple" species survey respondents were referring to, it should be noted that sugar maple/hard maple was also specifically listed 34 times, along with striped maple and red maple.

Indications of regional differences in specific "indicator trees" were found. For example, sugar maple was found to be the predominant associate in all regions of the state except the southeastern portion of the state (Piedmont Province). In the southeastern portion of the state, tulip poplar was the most common associate with ginseng.

Table 1. Over story trees associated with American ginseng in Pennsylvania (n = 54 sites/270 plots).

	Scientific name	Common name	Family	Number of sites present	Percentage of sites	Number of plots present	Percentage of plots
1	*Acer saccharum* Marshall	Sugar maple	Sapindaceae	38	69.1	151	59.9
2	*Fraxinus americana* L.	White ash	Oleaceae	33	60.0	83	30.7
3	*Tilia americana* L.	American basswood	Tiliaceae	32	58.2	84	31.1
4	*Liriodendron tulipifera* L.	Tulip-poplar	Magnoliaceae	26	47.3	74	27.4
5	*Prunus serotina* L.	Black cherry	Rosaceae	25	45.5	53	19.6
6	*Acer rubrum* L.	Red maple	Sapindaceae	24	43.6	51	18.9
7	*Quercus rubra* L.	Northern red oak	Fagaceae	24	43.6	49	18.1
8	*Fagus grandifolia* Ehrhart	American beech	Fagaceae	23	41.8	38	14.1
9	*Quercus alba* L.	White oak	Fagaceae	14	25.5	24	8.9
10	*Betula lenta* L.	Black birch	Betulaceae	12	21.8	23	8.5
11	*Tsuga canadensis* (L.) Carrière	Eastern hemlock	Pinaceae	12	21.8	16	5.9
12	*Quercus velutina* Lam.	Black oak	Fagaceae	9	16.4	9	3.3
13	*Carya glabra* (Mill.) Sweet	Pignut hickory	Juglandaceae	8	14.5	14	5.2

14	*Carya tomentosa* (Poir.) Nutt.	Mockernut hickory	Juglandaceae	7	12.7	11	4.1
15	*Quercus montana* Willd.	Chestnut oak	Fagaceae	7	12.7	9	3.3
16	*Juglans nigra* L.	Black walnut	Juglandaceae	5	9.1	14	5.2
17	*Betula alleghaniensis* Britton	Yellow birch	Betulaceae	5	9.1	12	4.4
18	*Carya ovata* (Mill.) K. Koch	Shagbark hickory	Juglandaceae	5	9.1	8	3.0
19	*Nyssa sylvatica* Marshall	Black gum	Cornaceae	5	9.1	5	1.9
20	*Carya cordiformis* (Wang.) K. Koch	Bitternut hickory	Juglandaceae	4	7.3	5	1.9
21	*Pinus strobus* L.	Eastern white pine	Pinaceae	4	7.3	5	1.9
22	*Ulmus americana* L.	American elm	Ulmaceae	4	7.3	5	1.9
23	*Magnolia acuminata* (L.) L.	Cucumber-tree	Magnoliaceae	4	7.3	4	1.5
24	*Prunus avium* (L.) L.	Sweet cherry	Rosaceae	4	7.3	4	1.5
25	*Populus grandidentata* Michx.	Big-tooth aspen	Salicaceae	3	5.5	6	2.2
26	*Ulmus rubra* Muhl.	Slippery elm	Ulmaceae	3	5.5	4	1.5
27	*Robinia pseudoacacia* L.	Black locust	Fabaceae	2	3.6	3	1.1
28	*Ailanthus altissima* L.	Tree-of-heaven	Simaroubaceae	1	1.8	3	1.1
29	*Aesculus glabra* Willd.	Ohio buckeye	Hippocastanaceae	1	1.8	1	0.4
30	*Sassafras albidum* (Nutt.) Nees	Sassafras	Lauraceae	1	1.8	1	0.4
31	*Acer platanoides* L.	Norway maple	Sapindaceae	1	1.8	1	0.4
32	*Celtis occidentalis* L.	Hackberry	Ulmaceae	1	1.8	1	0.4

Note: All common and scientific names are from: The Plants of Pennsylvania, 2nd edition. A.F. Rhoads and T.A. Block. 2007. University of Pennsylvania Press, Philadelphia, PA.

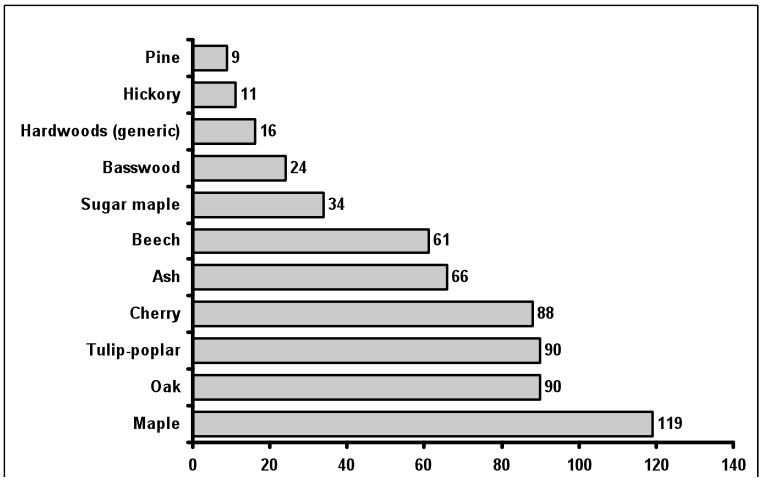

Figure 4. Survey responses for top *tree* indicators of "good" ginseng habitat.

Vegetation – herbs

A total of 143 species of herbaceous plants were found to be associates of ginseng in Pennsylvania (Table 2). The most frequent associate was Jack-in-the-pulpit (also known as Indian-turnip). This plant species co-occurred with ginseng on ~91 percent of the research sites, and ~80 percent of the plots. Solomon's-seal, enchanter's-nightshade, sweet-scented bedstraw, and mayapple rounded out the "top 5" herbaceous indicators.

Many of the top associated herbs have "weedy" tendencies and may not be reliable "indicators" of ginseng habitat. Mayapple, for example, is a plant that can be found in a variety of habitats including partially shaded pastures and fields. Consequently, these results need to be considered in light of the specific traits of each plant. Determining which top indicators have similar life cycle and ecological requirements as ginseng is perhaps the best approach to making indicators more reliable.

In looking at Table 2, it is perhaps notable that less "weedy" species such as doll's-eyes and its close relative black cohosh show up 12th and 13th respectively. Both plants were listed by survey respondents as "good" indicators and black cohosh, in particular, was listed the most times as an herbaceous "indicator" plant on surveys (Figure 5). "Cohosh" in general was also the third most commonly listed plant, although it is difficult to know which "cohosh" is being referred to (i.e., could refer to blue cohosh as well). Interestingly, the second most commonly listed species was Jack-in-the-pulpit/Indian-turnip, the top associated plant in field studies.

Regional differences in the occurrence of doll's-eye and black cohosh as associates of ginseng was detected. Doll's-eyes was a more common associate in the northern region of the state while black cohosh was more common across the southern region. This suggests that black cohosh may be a more appropriate indicator of ginseng habitat and growing sites in the southern parts of Pennsylvania, while doll's-eyes may be more useful in the northern parts of the state.

Table 2. Flowering herbaceous plants associated with American ginseng in Pennsylvania (n = 54 sites/270 plots).

	Scientific name	Common name	Family	Number of sites present	Percentage of sites	Number of plots present	Percentage of plots
1	*Arisaema triphyllum* (L.) Schott	Jack-in-the-pulpit	Araceae	50	90.9	216	80.0
2	*Polygonatum pubescens* (Willd.) Pursh	Solomon's-seal	Ruscaceae	43	78.2	104	38.5
3	*Circaea canadensis* (L.) Hill	Enchanter's-nightshade	Onagraceae	40	72.7	158	58.5
4	*Galium triflorum*	Sweet-scented	Rubiaceae	37	67.3	110	40.7

	Michx.	bedstraw					
5	*Podophyllum peltatum* L.	Mayapple	Berberidaceae	35	63.6	101	37.4
6	*Maianthemum racemosum* Link.	False Solomon's-seal	Ruscaceae	34	61.8	90	33.3
7	*Ageratina altissima* (L.) R.M. King & H. Robinson	White-snakeroot	Asteraceae	32	58.2	95	35.2
8	*Eurybia divaricata* (L.) Nesom	White wood aster	Asteraceae	31	56.4	88	32.6
9	*Persicaria virginiana* (L.) Gaertner	Jumpseed	Polygonaceae	28	50.9	83	30.7
10	*Viola pubescens* Aiton	Downy yellow violet	Violaceae	28	50.9	71	26.3
11	*Osmorhiza claytonii* (Michx.) C.B. Clarke	Sweet-cicely	Apiaceae	26	47.3	69	25.6
12	*Actaea pachypoda* Elliot	Doll's-eyes	Ranunculaceae	24	43.6	78	28.9
13	*Actaea racemosa* L.	Black cohosh	Ranunculaceae	23	41.8	80	29.6
14	*Galium circaezans* Michx.	Wild-licorice	Rubiaceae	23	41.8	66	24.4
15	*Trillium erectum* L.	Purple trillium	Melanthiaceae	23	41.8	50	18.5
16	*Collinsonia canadensis* L.	Horse-balm	Lamiaceae	22	40.0	56	20.7
17	*Pilea pumila* (L.) A. Gray	Clearweed	Urticaceae	22	40.0	64	23.7
18	*Viola* spp.	Violet	Violaceae	22	40.0	56	20.7
19	*Geum canadense* Jacq.	White avens	Rosaceae	21	38.2	38	14.1
20	*Uvularia perfoliata* L.	Bellwort	Colchicaceae	21	38.2	50	18.5
21	*Alliaria petiolata* (M. Bieb.) Cavara & Grande	Garlic-mustard	Brassicaceae	20	36.4	69	25.6
22	*Prenanthes* sp.	Rattlesnake root	Asteraceae	20	36.4	41	15.2
23	*Ranunculus abortivus* L.	Small-flowered crowfoot	Ranunculaceae	20	36.4	31	11.5
24	*Caulophyllum thalictroides* (L.) Michx.	Blue cohosh	Berberidaceae	19	34.5	51	18.9
25	*Geranium maculatum* L.	Wood geranium	Geraniaceae	19	34.5	42	15.6
26	*Viola hirsutula* Brainerd	Southern wood violet	Violaceae	19	34.5	53	19.6
27	*Impatiens* sp.	Jewelweed	Balsaminaceae	18	32.7	49	18.1
28	*Viola canadensis* L.	Canada violet	Violaceae	18	32.7	65	24.1

29	*Asarum canadense* L.	Wild ginger	Aristolochiaceae	17	30.9	39	14.4
30	*Dioscorea villosa* L.	Wild yam	Dioscoreaceae	17	30.9	41	15.2
31	*Sanicula canadensis* L.	Canadian sanicle	Apiaceae	17	30.9	41	15.2
32	*Laportea canadensis* (L.) Wedd.	Wood nettle	Urticaceae	16	29.1	37	13.7
33	*Viola blanda* Willd.	Sweet white violet	Violaceae	16	29.1	46	17.0
34	*Viola rostrata* Pursh	Long-spurred violet	Violaceae	16	29.1	38	14.1
35	*Mitella diphylla* L.	Bishop's-cap	Saxifragaceae	15	27.3	27	10.0
36	*Disporum lanuginosum* (Michx.) G. Nicholson	Yellow mandarin	Colchicaceae	14	25.5	34	12.6
37	*Aralia nudicaulis* L.	Wild sarsaparilla	Araliaceae	13	23.6	27	10.0
38	*Maianthemum canadense* Desf.	Canada mayflower	Ruscaceae	13	23.6	30	11.1
39	*Osmorhiza longistylis* (Torr.) DC	Aniseroot	Apiaceae	13	23.6	36	13.3
40	*Dicentra canadensis* (Goldie) Walp.	Squirrel-corn	Papaveraceae	12	21.8	45	16.7
41	*Erythronium americanum* Ker Gawl.	Yellow trout-lily	Liliaceae	12	21.8	48	17.8
42	*Galium aparine* L.	Bedstraw	Rubiaceae	12	21.8	42	15.6
43	*Anemone acutiloba* (DC) G. Lawson	Liverleaf	Ranunculaceae	12	21.8	26	9.6
44	*Anemone americana* (DC) H. Hara	Liverleaf	Ranunculaceae	12	21.8	24	8.9
45	*Tiarella cordifolia* L.	Foamflower	Saxifragaceae	12	21.8	28	10.4
46	*Amphicarpa bracteata* (L.) Fernald	Hog-peanut	Fabaceae	11	20.0	20	7.4
47	*Hydrophyllum virginianum* L.	Virginia waterleaf	Boraginaceae	11	20.0	29	10.7
48	*Medeola virginiana* L.	Indian cucumber-root	Liliaceae	11	20.0	16	5.9
49	*Persicaria longiseta* (Bruijn) Kitagawa	Low smartweed	Polygonaceae	11	20.0	26	9.6
50	*Thalictrum thalictroides* (L.) A.J. Eames & B. Boivin	Rue anemone	Ranunculaceae	11	20.0	19	7.0
51	*Epipactis helleborine* (L.)	Bastard hellebore	Orchidaceae	10	18.2	17	6.3

	Crantz						
52	*Phryma leptostachya* L.	Lopseed	Phrymaceae	10	18.2	22	8.1
53	*Polygonatum biflorum* (Walter) Elliott	Solomon's-seal	Ruscaceae	10	18.2	21	7.8
54	*Ranunculus recurvatus* Poir.	Hooked crowfoot	Ranunculaceae	10	18.2	18	6.7
55	*Sanguinaria canadensis* L.	Bloodroot	Papaveraceae	10	18.2	33	12.2
56	*Cardamine concatenata* (Michx.) Sw.	Toothwort	Brassicaceae	9	16.4	30	11.1
57	*Cardamine diphylla* (Michx.) Wood	Two-leaved toothwort	Brassicaceae	9	16.4	32	11.9
58	*Impatiens capensis* Meerb.	Jewelweed	Balsaminaceae	9	16.4	32	11.9
59	*Mitchella repens* L.	Partridge-berry	Rubiaceae	9	16.4	14	5.2
60	*Phytolacca americana* L.	Pokeweed	Phytolaccaceae	9	16.4	14	5.2
61	*Trillium grandiflorum* (Michx.) Salisb.	Large-flowered trillium	Melanthiaceae	9	16.4	19	7.0
62	*Viola rotundifolia* Michx.	Round-leaved violet	Violaceae	9	16.4	19	7.0
63	*Claytonia caroliniana* Michx.	Carolina spring-beauty	Portulacaceae	8	14.5	35	13.0
64	*Cryptotaenia canadensis* (L.) DC	Honewort	Apiaceae	8	14.5	17	6.3
65	*Allium tricoccum* Aiton	Ramps	Alliaceae	7	12.7	22	8.1
66	*Sanicula trifoliata* E.P. Bicknell	Large-fruited sanicle	Apiaceae	7	12.7	14	5.2
67	*Solidago flexicaulis* L.	Zigzag goldenrod	Asteraceae	7	12.7	17	6.3
68	*Fallopia cilinodis* (Michx.) Holob	Fringed bindweed	Polygonaceae	6	10.9	10	3.7
69	*Oxalis acetosella* L.	Northern wood-sorrel	Oxalidaceae	6	10.9	15	5.6
70	*Panax trifolius* L.	Dwarf ginseng	Araliaceae	6	10.9	9	3.3
71	*Potentilla simplex* Michx.	Old-field cinquefoil	Rosaceae	6	10.9	11	4.1
72	*Sedum ternatum* Michx.	Wild stonecrop	Crassulaceae	6	10.9	19	7.0
73	*Uvularia sessilifolia* L.	Bellwort	Colchicaceae	6	10.9	9	3.3
74	*Geranium robertianum* L.	Herb-robert	Geraniaceae	5	9.1	15	5.6
75	*Thalictrum dioicum* L.	Early meadow-rue	Ranunculaceae	5	9.1	6	2.2
76	*Claytonia virginica* L.	Spring-beauty	Portulacaceae	4	7.3	10	3.7

77	*Desmodium glutinosum* (Muhl. ex Willd.) A.W. Wood	Sticky tick-clover	Fabaceae	4	7.3	7	2.6
78	*Galium* sp.	Bedstraw	Rubiaceae	4	7.3	8	3.0
79	*Hackelia virginiana* (L.) I.M. Johnston	Beggar's-lice	Boraginaceae	4	7.3	7	2.6
80	*Hydrastis canadensis* L.	Goldenseal	Ranunuculaceae	4	7.3	7	2.6
81	*Impatiens pallida* Nutt.	Pale jewelweed	Balsaminaceae	4	7.3	13	4.8
82	*Pyrola elliptica* Nutt.	Shinleaf	Ericaceae	4	7.3	4	1.5
83	*Symphyotrichum prenanthoides* (Muhl. ex Willd.) Nesom	Zig-zag aster	Asteraceae	4	7.3	4	1.5
84	*Symplocarpus foetidus* (L.) Salisb. ex Nutt.	Skunk-cabbage	Araceae	4	7.3	6	2.2
85	*Agrimonia rostellata* Wallr.	Woodland agrimony	Rosaceae	3	5.5	3	1.1
86	*Aralia racemosa* L.	Spikenard	Araliaceae	3	5.5	3	1.1
87	*Aristolochia serpentaria* L.	Virginia snakeroot	Aristolochiaceae	3	5.5	3	1.1
88	*Circaea alpina* L.	Enchanter's-nightshade	Onagraceae	3	5.5	7	2.6
89	*Dicentra cucullaria* (L.) Bernh.	Dutchman's-breeches	Papaveraceae	3	5.5	4	1.5
90	*Galearis spectabilis* (L.) Raf.	Showy orchis	Orchidaceae	3	5.5	6	2.2
91	*Galium lanceolatum* Torr.	Wild-licorice	Rubiaceae	3	5.5	7	2.6
92	*Geum* sp.	Avens	Rosaceae	3	5.5	7	2.6
93	*Hydrophyllum canadense* L.	Canadian waterleaf	Boraginaceae	3	5.5	7	2.6
94	*Sanicula* sp.	Sanicle	Apiaceae	3	5.5	5	1.9
95	*Sanicula odorata* (Raf.) K.M. Pryer & L.R. Phillippe	Yellow-flowered sanicle	Apiaceae	3	5.5	7	2.6
96	*Solidago* sp.	Goldenrod	Asteraceae	3	5.5	4	1.5
97	*Trientalis borealis* Raf.	Starflower	Myrsinaceae	3	5.5	4	1.5
98	*Viola striata* Aiton	Striped violet	Violaceae	3	5.5	3	1.1
99	Wild mint family member (TBD)		Lamiaceae	3	5.5	3	1.1
100	*Agrimonia* sp.	Agrimony	Rosaceae	2	3.6	2	0.7
101	*Agrimonia gryposepala* Wallr.	Agrimony	Rosaceae	2	3.6	3	1.1

102	*Aquilegia canadensis* L.	Wild columbine	Ranunculaceae	2	3.6	6	2.2
103	*Cardamine pensylvanica* Muhl. ex Willd.	Pennsylvania bittercress	Brassicaceae	2	3.6	2	0.7
104	*Corydalis flavula* (Raf.) DC	Yellow fumewort	Papaveraceae	2	3.6	5	1.9
105	*Cypripedium parviflorum* Salisb. var. *pubescens* (Willd.) Correll	Yellow lady's-slipper	Orchidaceae	2	3.6	2	0.7
106	*Desmodium* sp.	Tick-trefoil	Fabaceae	2	3.6	2	0.7
107	*Desmodium nudiflorum* (L.) DC	Naked-flowered tick-trefoil	Fabaceae	2	3.6	5	1.9
108	*Fragaria vesca* L.	Sow-teat strawberry	Rosaceae	2	3.6	4	1.5
109	*Houstonia caerulea* L.	Bluets	Rubiaceae	2	3.6	2	0.7
110	*Monotropa uniflora* L.	Indian-pipe	Ericaceae	2	3.6	2	0.7
111	*Obolaria virginica* L.	Pennywort	Gentianaceae	2	3.6	2	0.7
112	*Oxalis violacea* L.	Violet wood-sorrel	Oxalidaceae	2	3.6	3	1.1
113	*Packera aurea* (L.) W.A. Weber & Á. Löve	Golden ragwort	Asteraceae	2	3.6	2	0.7
114	*Phlox divaricata* L.	Wild blue phlox	Polemoniaceae	2	3.6	4	1.5
115	*Solidago caesia* L.	Bluestem goldenrod	Asteraceae	2	3.6	6	2.2
116	*Anemone quinquefolia* L.	Wood anemone	Ranunculaceae	1	1.8	1	0.4
117	*Aplectrum hyemale* (Muhl. ex Willd.) Butt.	Puttyroot	Orchidaceae	1	1.8	1	0.4
118	*Arabis canadensis* L.	Sicklepod	Brassicaceae	1	1.8	1	0.4
119	*Arabis laevigata* (Muhl. ex Willd.) Poir. var. *laevigata*	Smooth rockcress	Brassicaceae	1	1.8	1	0.4
120	*Asclepias exaltata* L.	Tall milkweed	Apocynaceae	1	1.8	1	0.4
121	*Bidens vulgata* Greene	Beggar-ticks	Asteraceae	1	1.8	1	0.4
122	*Campanula americana* L.	Tall bellflower	Campanulaceae	1	1.8	1	0.4
123	*Cardamine angustata* O.E. Schulz	Toothwort	Brassicaceae	1	1.8	1	0.4
124	*Cardamine bulbosa* (Schreb. ex Muhl.) Britton, Stearns & Poggenb.	Bittercress	Brassicaceae	1	1.8	1	0.4

125	*Chelidonium majus* L.	Greater celandine	Papaveraceae	1	1.8	1	0.4
126	*Clintonia umbellulata* (Michx.) Morong	Speckled wood-lily	Liliaceae	1	1.8	3	1.1
127	*Cynoglossum virginianum* L.	Wild comfrey	Boraginaceae	1	1.8	2	0.7
128	*Eurybia macrophylla* (L.) Cass.	Bigleaf aster	Asteraceae	1	1.8	1	0.4
129	*Fallopia convolvulus* (L.) Á. Löve	Black bindweed	Polygonaceae	1	1.8	1	0.4
130	*Goodyera pubescens* (Willd.) R. Br.	Downy rattlesnake-plantain	Orchidaceae	1	1.8	2	0.7
131	*Lobelia inflata* L.	Indian-tobacco	Campanulaceae	1	1.8	1	0.4
132	*Lysimachia quadrifolia* L.	Whorled loosestrife	Myrsinaceae	1	1.8	1	0.4
133	*Persicaria perfoliata* (L.) H. Gross	Mile-a-minute weed	Polygonaceae	1	1.8	3	1.1
134	*Potentilla canadensis* L.	Cinquefoil	Rosaceae	1	1.8	1	0.4
135	*Ranunculus hispidus* Michx.	Hairy buttercup	Ranunculaceae	1	1.8	1	0.4
136	*Rumex obtusifolius* L.	Bitter dock	Polygonaceae	1	1.8	1	0.4
137	*Saxifraga virginiensis* Michx.	Early saxifrage	Saxifragaceae	1	1.8	1	0.4
138	*Streptopus roseus* Michx.	Rose mandarin	Liliaceae	1	1.8	1	0.4
139	*Thalictrum pubescens* Pursh	Tall meadow-rue	Ranunculaceae	1	1.8	1	0.4
140	*Tussilago farfara* L.	Coltsfoot	Asteraceae	1	1.8	1	0.4
141	*Valerianella chenopodiifolia* (Pursh) DC	Goose-foot corn-salad	Valerianaceae	1	1.8	1	0.4
142	*Waldsteinia fragarioides* (Michx.) Tratt.	Barren-strawberry	Rosaceae	1	1.8	1	0.4
143	*Zizia aurea* (L.) W.D.J. Koch	Golden-alexander	Apiaceae	1	1.8	2	0.7

Note: All common and scientific names are from: The Plants of Pennsylvania, 2nd edition. A.F. Rhoads and T.A. Block. 2007. University of Pennsylvania Press, Philadelphia, PA.

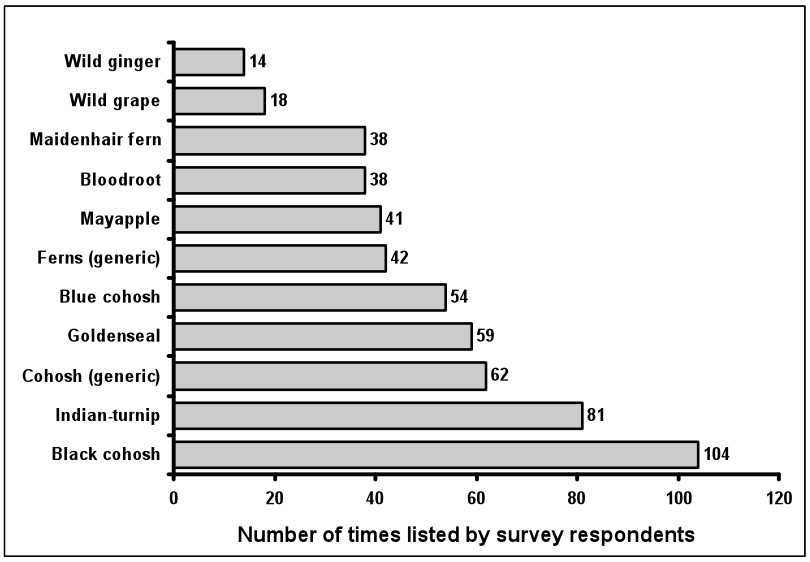

Figure 5. Survey responses for top *plant* indicators of "good" ginseng habitat.

Vegetation – shrubs and understory trees

Thirty-seven species of shrubs and small understory trees were recorded as associates of ginseng in Pennsylvania (Table 3). The "top 5 " were spicebush (~54 percent of sites), witch-hazel (~51 percent), maple-leaved viburnum (~51 percent), multiflora rose (~45 percent) and hop-hornbeam (~44 percent). It should be noted that multiflora rose is not native to Pennsylvania nor North America.

Spicebush was also the top indicator of "good" sites according to survey respondents (Figure 6). This was followed by wild grape, blackberry, striped maple, and multiflora rose/wild rose. Wild grape is technically a vine but it was nevertheless listed by respondents. Striped maple was listed as both a "tree" and "shrub" by respondents and so appears twice in survey response totals (note previous mention under tree results).

Table 3. Understory trees and shrubs associated with American ginseng in Pennsylvania (n = 54 sites/270 plots).

	Scientific name	Common name	Family	Number of sites present	Percentage of sites	Number of plots present	Percentage of plots
1	*Lindera benzoin* (L.) Blume	Spicebush	Lauraceae	30	54.5	111	41.1
2	*Hamamelis virginiana* L.	Witch-hazel	Hamamelidaceae	28	50.9	60	22.2
3	*Viburnum acerifolium* L.	Maple-leaved viburnum	Adoxaceae	28	50.9	62	23.0

4	*Rosa multiflora* Thunb. ex Murray	Multiflora rose	Rosaceae	25	45.5	56	20.7
5	*Ostrya virginiana* (Mill.) K. Koch	Hop-hornbeam	Betulaceae	24	43.6	43	15.9
6	*Ribes cynosbati* L.	Prickly gooseberry	Grossulariaceae	19	34.5	32	11.9
7	*Acer pensylvanicum* L.	Striped maple	Sapindaceae	16	29.1	50	18.5
8	*Rubus* spp.	Blackberry	Rosaceae	16	29.1	25	9.3
9	*Sambucus racemosa* L.	Red-berried elder	Adoxaceae	16	29.1	29	10.7
10	*Berberis thunbergii* DC	Japanese barberry	Berberidaceae	14	25.5	22	8.1
11	*Rubus occidentalis* L.	Black raspberry	Rosaceae	11	20.0	15	5.6
12	*Prunus virginiana* L.	Choke cherry	Rosaceae	8	14.5	21	7.8
13	*Carpinus caroliniana* Walter	Hornbeam	Betulaceae	7	12.7	13	4.8
14	*Hydrangea arborescens* L.	Wild hydrangea	Hydrangeaceae	7	12.7	12	4.4
15	*Rubus allegheniensis* Porter	Common blackberry	Rosaceae	7	12.7	15	5.6
16	*Rubus phoenicolasius* Maxim.	Wineberry	Rosaceae	7	12.7	18	6.7
17	*Viburnum prunifolium* L.	Black-haw	Adoxaceae	7	12.7	14	5.2
18	*Cornus florida* L.	Flowering dogwood	Cornaceae	5	9.1	6	2.2
19	*Corylus americana* Walter	American hazelnut	Betulaceae	4	7.3	4	1.5
20	*Acer spicatum* Lam.	Mountain maple	Sapindaceae	3	5.5	3	1.1
21	*Euonymus alatus* (Thunb.) Siebold	Burning-bush	Celastraceae	3	5.5	5	1.9
22	*Ligustrum* spp.	Privet	Oleaceae	3	5.5	4	1.5
23	*Asimina triloba* (L.) Dunal	Pawpaw	Annonaceae	2	3.6	5	1.9
24	*Corylus cornuta* Marshall	Beaked hazelnut	Betulaceae	2	3.6	2	0.7
25	*Rhododendron maximum* L.	Rosebay	Ericaceae	2	3.6	3	1.1
26	*Ribes hirtellum* Michx.	Northern wild gooseberry	Grossulariaceae	2	3.6	5	1.9
27	*Aralia spinosa* L.	Hercules'-club	Araliaceae	1	1.8	1	0.4
28	*Cercis canadensis* L.	Redbud	Fabaceae	1	1.8	2	0.7
29	*Cornus alternifolia* L.f.	Alternate-leaved dogwood	Cornaceae	1	1.8	2	0.7
30	*Crataegus* spp.	Hawthorn	Rosaceae	1	1.8	1	0.4
31	*Ligustrum vulgare* L.	Common privet	Oleaceae	1	1.8	2	0.7

32	*Lonicera canadensis* Marshall	Fly-honeysuckle	Caprifoliaceae	1	1.8	1	0.4
33	*Lonicera morrowii* A. Gray	Morrow's honeysuckle	Caprifoliaceae	1	1.8	3	1.1
34	*Ribes rotundifolium* Michx.	Wild gooseberry	Grossulariaceae	1	1.8	1	0.4
35	*Rubus canadensis* L.	Smooth blackberry	Rosaceae	1	1.8	1	0.4
36	*Sambucus canadensis* L.	American elder	Adoxaceae	1	1.8	1	0.4
37	*Staphylea trifolia* L.	Bladdernut	Staphyleaceae	1	1.8	1	0.4

Note: All common and scientific names are from: The Plants of Pennsylvania, 2nd edition. A.F. Rhoads and T.A. Block. 2007. University of Pennsylvania Press, Philadelphia, PA.

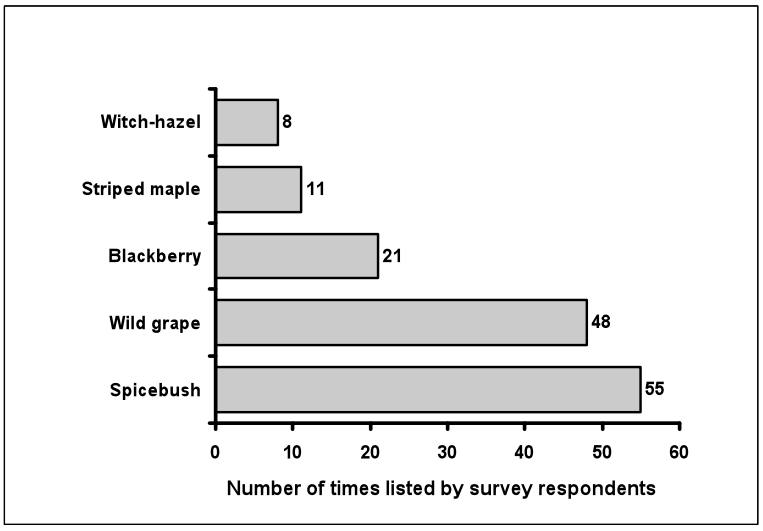

Figure 6. Survey responses for top *shrub* indicators of "good" ginseng habitat.

Vegetation – ferns

Fifteen species of ferns were identified as associates of ginseng in Pennsylvania (Table 4). The "top 5" were Christmas fern (~73 percent of sites), rattlesnake fern (~67 percent), marginal wood fern (~53 percent), spinulose wood fern (~49 percent) and evergreen wood fern (~42 percent).

Maidenhair fern is notably absent from the top 5, but did rank 6th. This is notable since maidenhair fern is commonly cited as an "indicator" of ginseng habitat by ginseng collectors and growers. It was, for example, the 9th most commonly listed "plant" indicator in the survey results from this study, and the most commonly cited specific fern indicator (Figure 7). Christmas fern and rattlesnake fern were also listed by survey respondents. It is worth noting that rattlesnake fern is know as "seng pointer" to many throughout Appalachia.

Regional differences in the occurrence of maidenhair versus rattlesnake fern were detected from field research plots. Maidenhair fern was found to be a more common associate of ginseng in the northern region of the state while rattlesnake fern was more common in the southern region.

Table 4. Ferns associated with American ginseng in Pennsylvania (n = 54 sites/270 plots).

	Scientific name	Common name	Family	Number of sites present	Percentage of sites	Number of plots present	Percentage of plots
1	*Polystichum acrostichoides* (Michx.) Schott	Christmas fern	Polypodiaceae	40	72.7	146	54.1
2	*Botrychium virginianum* (L.) Sw.	Rattlesnake fern	Ophioglossaceae	37	67.3	102	37.8
3	*Dryopteris marginalis* (L.) A. Gray	Marginal wood fern	Polypodiaceae	29	52.7	92	34.1
4	*Dryopteris carthusiana* (Vill.) H.P. Fuchs	Spinulose wood fern	Polypodiaceae	27	49.1	96	35.6
5	*Dryopteris intermedia* (Muhl.) A. Gray	Evergreen wood fern	Polypodiaceae	23	41.8	68	25.2
6	*Adiantum pedatum* L.	Northern maidenhair	Polypodiaceae	15	27.3	36	13.3
7	*Dennstaedtia punctilobula* (Michx.) T. Moore	Hay-scented fern	Polypodiaceae	12	21.8	21	7.8
8	*Deparia acrostichoides* (Sw.) M. Kato	Silvery glade fern	Polypodiaceae	10	18.2	25	9.3
9	*Asplenium platyneuron* (L.) Britton, Stearns & Poggenb.	Ebony spleenwort	Polypodiaceae	5	9.1	7	2.6
10	*Botrychium oneidense* (Gilbert) House	Blunt-lobed grape fern	Ophioglossaceae	4	7.3	6	2.2
11	*Phegopteris connectilis* (Michx.) D. Watt	Long beech fern	Polypodiaceae	3	5.5	5	1.9
12	*Diphasiastrum digitatum* (Dill. ex A. Braun) Holub	Running-pine	Lycopodiaceae	2	3.6	2	0.7
13	*Onoclea sensibilis* L.	Sensitive fern	Polypodiaceae	2	3.6	2	0.7
14	*Osmunda claytoniana* L.	Interrupted fern	Osmundaceae	2	3.6	3	1.1
15	*Osmunda* sp.		Osmundaceae	2	3.6	3	1.1
16	*Botrychium dissectum* Spreng.	Cut-leaved grape fern	Ophioglossaceae	1	1.8	1	0.4

Note: All common and scientific names are from: The Plants of Pennsylvania, 2nd edition. A.F. Rhoads and T.A. Block. 2007. University of Pennsylvania Press, Philadelphia, PA.

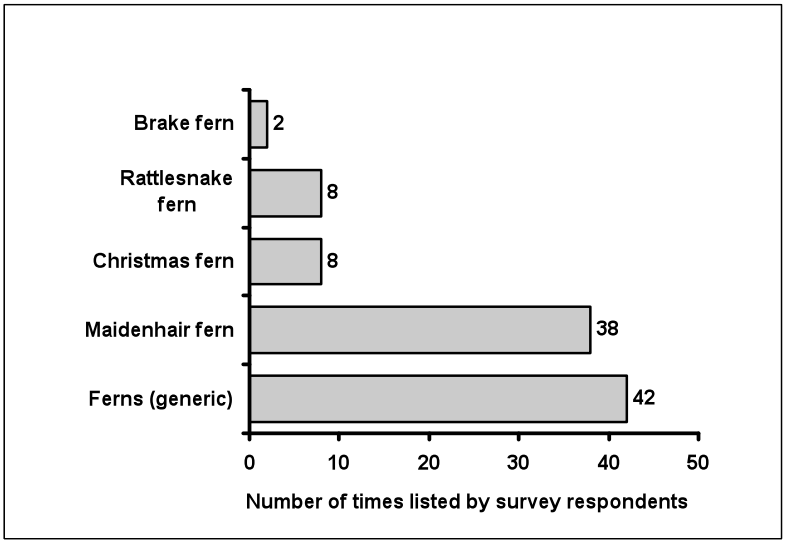

Figure 7. Survey responses for top *fern* indicators of "good" ginseng habitat.

Soils – chemistry

The soil pH associated with ginseng was found to vary greatly across Pennsylvania. Soil pH ranged from a low of 4.4 to a high of 7.3 (Table 5). Average minimum, maximum, and mean soil pH values differed according to physiographic province, with generally increasing average (i.e., mean) values observed from west to east within the state (Figure 8). When considered in light of the fact that all samples were only collected from plants and populations showing evidence of reproduction, these data appear to suggest that pH can vary considerably without detriment to plants. Additional research, however, is needed to determine if soil pH influences subtle, yet important, factors such as rate of growth, number of berries produced, and/or final root properties.

Soils – fertility and calcium

In general soil fertility was low for all major nutrients, although there was considerable variation in nutrients such as phosphorus, for example (Table 5). Calcium levels were of particular interest since research conducted in other states has suggested that high calcium levels may be important for "good" ginseng growth (see page 10, this document). The present study found significant variation in calcium levels although most sites had calcium levels at 1,000 pounds per acre and above. Average calcium levels differed between physiographic provinces with the Appalachian Plateau province sites, in particular, generally having the lowest values (Figure 9). As with pH, additional research is needed to determine if calcium influences important performance traits such as growth rate, reproductive output, and root quality.

Table 5. Soil pH and fertility results for American ginseng in Pennsylvania (n = 54).

Region	County	Province [a]	pH [b]	P (lbs/ac) [b]	K (lbs/ac) [b]	Ca (lbs/ac) [b]	Mg (lbs/ac) [b]
NW	Butler	AP	4.8 ± 0.1	82 ± 25	175 ± 20	1,096 ± 297	168 ± 38
NW	Forest	AP	4.6 ± 0.1	455 ± 181	191 ± 53	706 ± 279	114 ± 45
NW	Jefferson	AP	5.1 ± 0.3	543 ± 291	149 ± 61	2,222 ± 932	206 ± 74
NW	Mercer	AP	5.4 ± 0.6	182 ± 102	204 ± 75	3,282 ± 1,295	400 ± 159
NW	Warren -1	AP	5.3 ± 0.5	38 ± 10	194 ± 9	3,278 ± 846	729 ± 247
NW	Warren -2	AP	5.2 ± 0.4	214 ± 51	364 ± 144	3,483 ± 1,733	365 ± 159
NW	Warren -3	AP	4.5 ± 0.2	258 ± 50	223 ± 89	2,086 ± 1,141	221 ± 104
SW	Allegheny -1	AP	4.8 ± 0.3	357 ± 170	196 ± 32	1,534 ± 778	171 ± 87
SW	Allegheny -2	AP	5.1 ± 0.2	110 ± 29	214 ± 84	1,707 ± 650	199 ± 72
SW	Beaver -1	AP	4.4 ± 0.1	70 ± 34	161 ± 5	923 ± 351	169 ± 35
SW	Beaver -2	AP	4.7 ± 0.3	46 ± 11	186 ± 52	829 ± 239	228 ± 146
SW	Cambria	AP	5.3 ± 0.7	42 ± 9	193 ± 30	4,815 ± 2,219	737 ± 449
SW	Fayette	AP	4.5 ± 0.2	37 ± 15	158 ± 42	495 ± 140	130 ± 58
SW	Greene -1	AP	5.1 ± 0.2	67 ± 24	256 ± 72	2,195 ± 1,298	288 ± 95
SW	Greene -2	AP	5.8 ± 0.5	110 ± 43	342 ± 97	4,863 ± 1,232	456 ± 166
SW	Indiana	AP	5.2 ± 0.4	718 ± 512	295 ± 105	2,956 ± 1,472	304 ± 124
SW	Somerset	AP	4.9 ± 0.1	37 ± 6	398 ± 53	1,587 ± 738	236 ± 83
SW	Washington -1	AP	5.3 ± 0.7	48 ± 24	261 ± 140	3,219 ± 2,652	416 ± 323
SW	Washington -2	AP	5.3 ± 0.4	48 ± 8	339 ± 128	2,796 ± 758	288 ± 100
SW	Washington -3	AP	4.7 ± 0.2	30 ± 5	206 ± 60	768 ± 377	143 ± 53
SW	Westmoreland	AP	4.8 ± 0.3	31 ± 28	260 ± 120	2,119 ± 1,017	294 ± 96
NC	Cameron -1	AP	4.9 ± 0.2	115 ± 39	245 ± 57	2,683 ± 1,159	326 ± 114

NC	Cameron -2	AP	6.0 ± 0.7	70 ± 14	228 ± 77	6,065 ± 1,604	672 ± 257
NC	Centre -1	RV	5.3 ± 0.4	59 ± 18	270 ± 57	3,026 ± 1,515	268 ± 70
NC	Centre -2	RV	5.9 ± 0.5	147 ± 49	187 ± 51	7,669 ± 3,132	610 ± 352
NC	Elk	AP	4.6 ± 0.2	365 ± 219	241 ± 67	2,205 ± 857	183 ± 59
NC	McKean -1	AP	4.5 ± 0.2	60 ± 18	205 ± 21	1,380 ± 600	182 ± 58
NC	McKean -2	AP	4.6 ± 0.2	199 ± 130	279 ± 79	2,425 ± 456	250 ± 53
NC	Tioga -1	AP	5.6 ± 0.3	252 ± 46	328 ± 71	6,516 ± 2,508	620 ± 243
NC	Tioga -2	AP	5.4 ± 0.4	102 ± 46	272 ± 29	5,178 ± 2,234	611 ± 205
NC	Union	RV	5.6 ± 0.4	38 ± 8	266 ± 93	3,287 ± 1,322	438 ± 235
SC	Bedford	RV	4.8 ± 0.3	435 ± 148	256 ± 70	3,101 ± 1,639	391 ± 216
SC	Cumberland	RV	5.0 ± 0.2	83 ± 17	241 ± 58	2,004 ± 1,072	307 ± 131
SC	Huntingdon -1	RV	5.4 ± 0.4	77 ± 39	159 ± 28	2,311 ± 958	256 ± 60
SC	Huntingdon -2	RV	7.3 ± 0.4	38 ± 11	318 ± 154	20,593 ± 16,059	774 ± 223
SC	Mifflin -1	RV	5.0 ± 0.3	47 ± 14	223 ± 44	1,191 ± 361	226 ± 81
SC	Mifflin -2	RV	5.2 ± 0.5	133 ± 25	199 ± 69	3,733 ± 2,215	276 ± 101
SC	Perry	RV	5.2 ± 0.3	376 ± 184	184 ± 46	4,870 ± 1,289	309 ± 86
NE	Bradford	AP	5.1 ± 0.2	45 ± 16	139 ± 27	2,618 ± 1,022	467 ± 134
NE	Lackawanna	RV	5.0 ± 0.3	259 ± 64	391 ± 99	5,070 ± 1,160	469 ± 130
NE	Luzerne	RV	5.4 ± 0.5	94 ± 45	168 ± 77	2,653 ± 1,793	272 ± 131
NE	Sullivan -1	AP	6.7 ± 0.4	51 ± 19	210 ± 132	11,326 ± 3,800	505 ± 121
NE	Sullivan -2	AP	5.6 ± 0.4	52 ± 7	260 ± 51	8,355 ± 2,493	571 ± 139
NE	Susquehanna	AP	4.6 ± 0.3	209 ± 117	324 ± 108	1,979 ± 665	293 ± 87
NE	Wayne	AP	6.1 ± 0.7	97 ± 66	193 ± 66	7,608 ± 1,765	485 ± 121
SE	Berks -1	NE	5.6 ± 0.3	205 ± 162	236 ± 29	2,652 ± 725	442 ± 101
SE	Berks -2	P	6.1 ± 0.2	64 ± 28	190 ± 25	3,294 ± 371	387 ± 31
SE	Berks -3	P	6.0 ± 0.4	46 ± 17	342 ± 75	5,403 ± 2,139	406 ± 103
SE	Berks -4	P	6.3 ± 0.3	129 ± 100	388 ± 75	5,769 ± 1,729	858 ± 193
SE	Chester	P	6.0 ± 0.8	35 ± 13	336 ± 200	1,732 ± 772	595 ± 357

SE	Lancaster -1	P	6.5 ± 0.4	36 ± 29	411 ± 44	5,836 ± 1,807	1,246 ± 306
SE	Lancaster -2	P	6.3 ± 0.6	21 ± 5	341 ± 209	3,943 ± 3,737	992 ± 944
SE	Lebanon	P	5.4 ± 0.4	49 ± 19	185 ± 80	1,866 ± 1,081	364 ± 202
SE	Lehigh	NE	6.4 ± 0.1	275 ± 128	381 ± 42	5,086 ± 1,464	611 ± 166

a- Physiographic province: AP = Appalachian Plateau, RV = Ridge and Valley, P = Piedmont, NE = New England
b- Sample size: n =5 samples per site

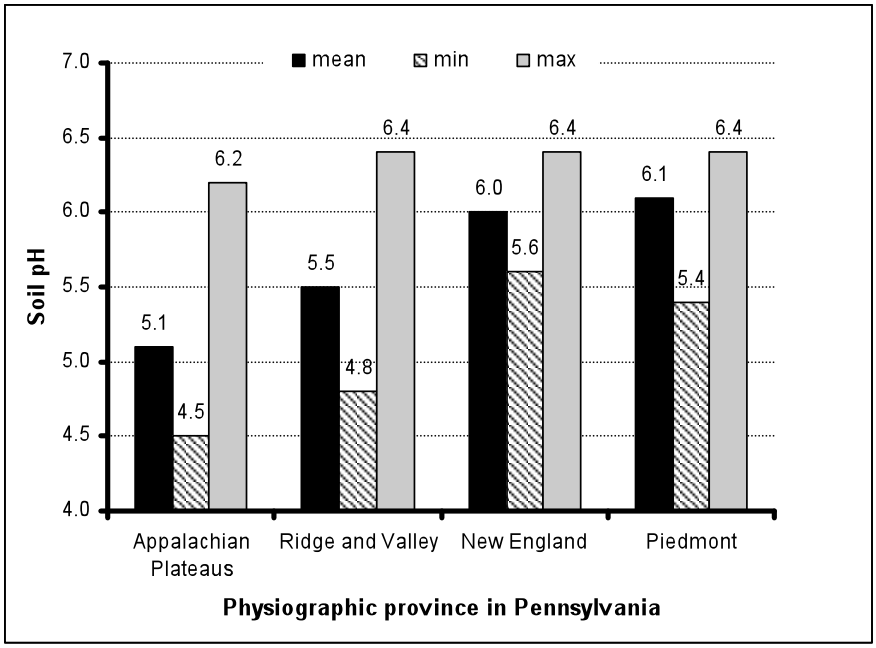

Figure 8. Soil pH values in relation to physiographic province in Pennsylvania.

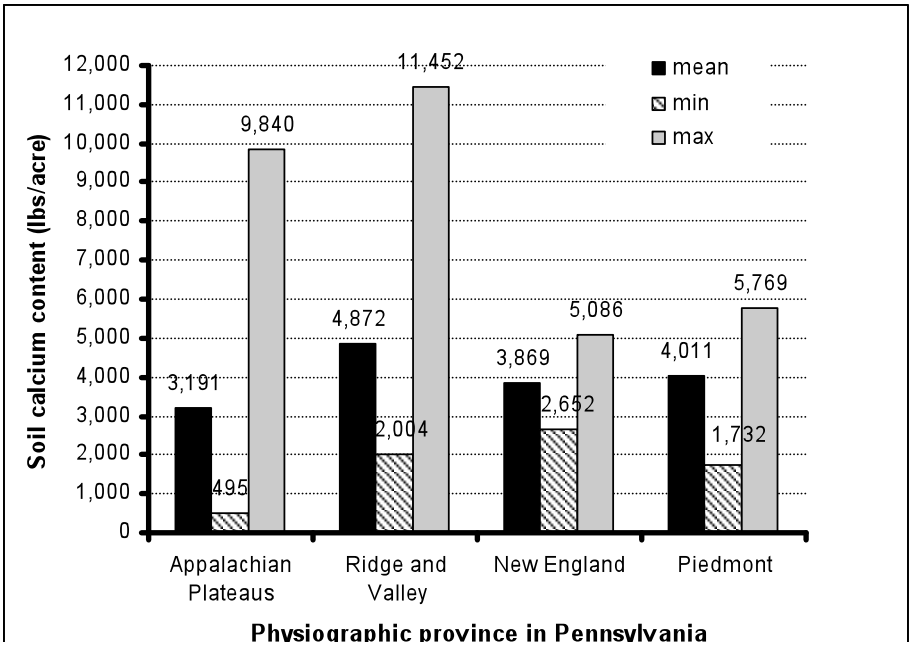

Figure 9. Soil calcium in relation to physiographic province in Pennsylvania.

Soils – texture

Soil texture (i.e., the relative proportion of sand, silt, and clay particles) was examined as a site factor of possible importance to ginseng. All texture samples were found to be "loamy" in nature, although there was some variation in the type of "loam" (Figure 10). These results suggest that very compact (e.g., clayey) or loose (e.g., sandy) soils may not be conducive to ginseng survival and growth in forested habitats.

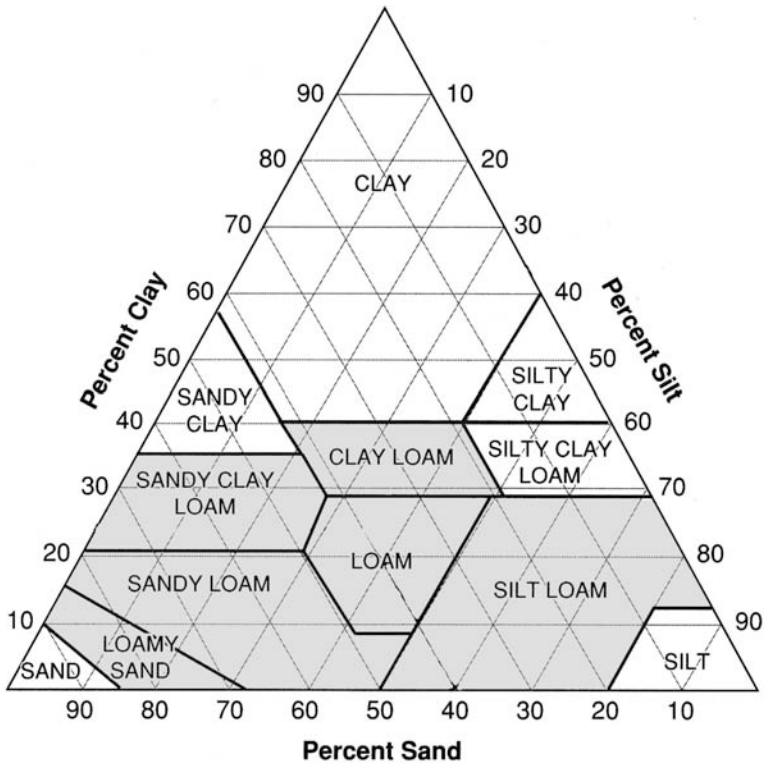

Figure 10. A "soil texture triangle" with shaded blocks representing textures found in this study.

Physiographic features – aspect, slope, topographic position, and elevation

Aspect is the compass directions towards which a particular hillside or mountainside faces. This study found that ginseng could be encountered on nearly any aspect, although there was a clear tendency towards north and east facing aspects, or a combination of these two aspects (e.g.,

northeast). Most locations were associated with a northeast aspect (Figure 11). There were no sites in this study that faced due west, although southwest facing sites were documented.

Slope is the percent change in vertical distance per 100 feet of horizontal ground. Most research sites were associated with sloping terrain of 1-35 percent. Very few sites were located on flat terrain or extremely steep terrain (Figure 12).

Topographic position refers to the relative location of plants or populations along a hill or mountainside. From the top of the hill or mountain to the bottom, the topographic categories that were used to identify this position were crest, upper, middle, lower, bottom. Most plants and populations were associated with mid-level topographic positions (Figure 13).

Elevation was not found to be consistent, even within a region or province, because of the overall changes in elevation that occur in Pennsylvania as one moves from northwest to southeast across the different physiographic provinces. Average elevation generally declines as one approaches the Piedmont province in southeastern Pennsylvania, which forms the edge of the mid-Atlantic coastal plain. The average elevation of ginseng research plots similarly declined from the western province (Appalachian Plateaus) to the easternmost province (Piedmont) (Figure 14). It would appear that relative elevation (i.e., topographic position) is much more important a consideration than actual elevation.

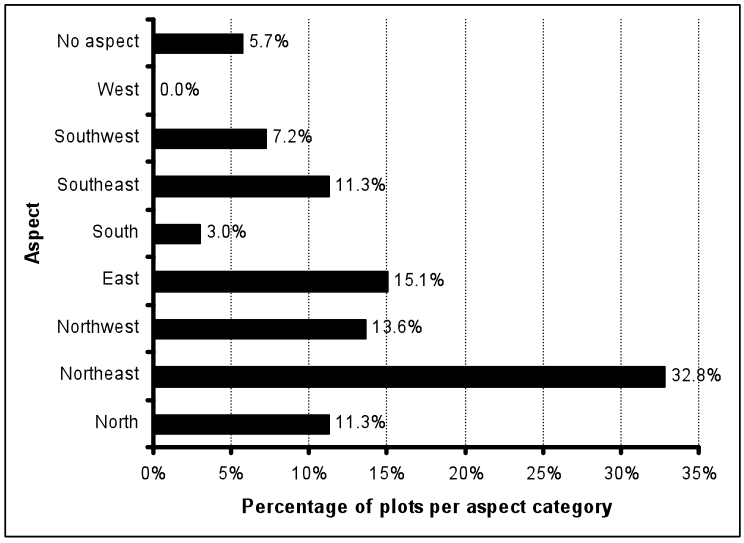

Figure 11. Aspects associated with ginseng in Pennsylvania.

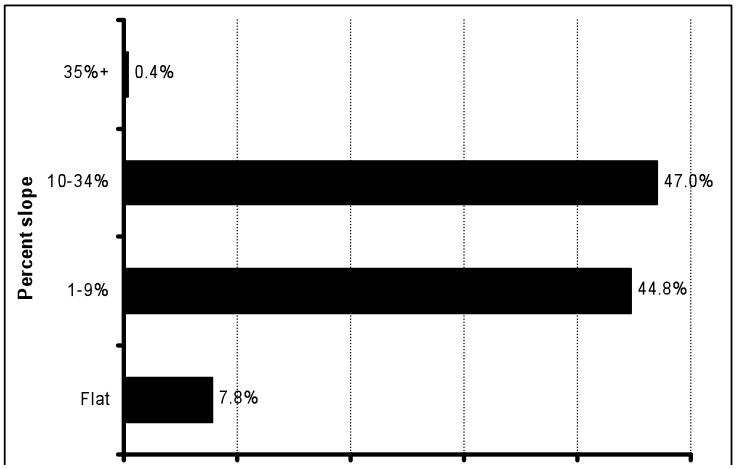

Figure 12. Slope values associated with ginseng in Pennsylvania.

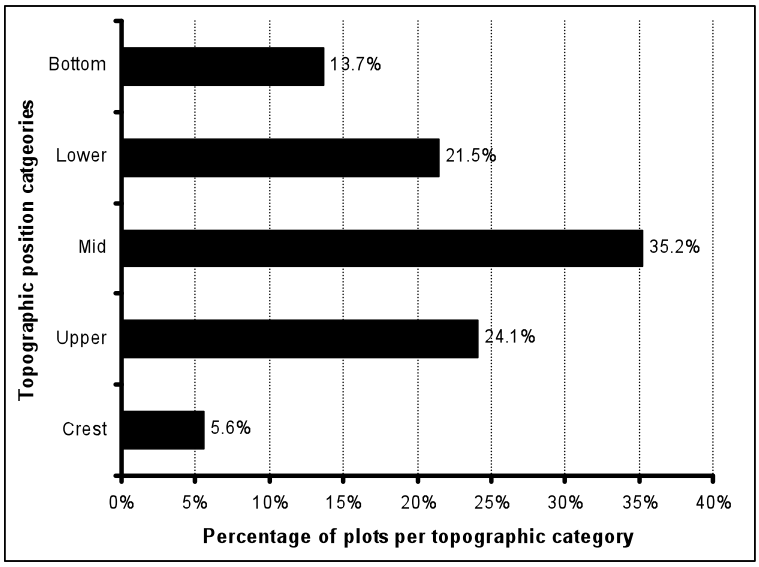

Figure 13. Topographic positions associated with ginseng in Pennsylvania.

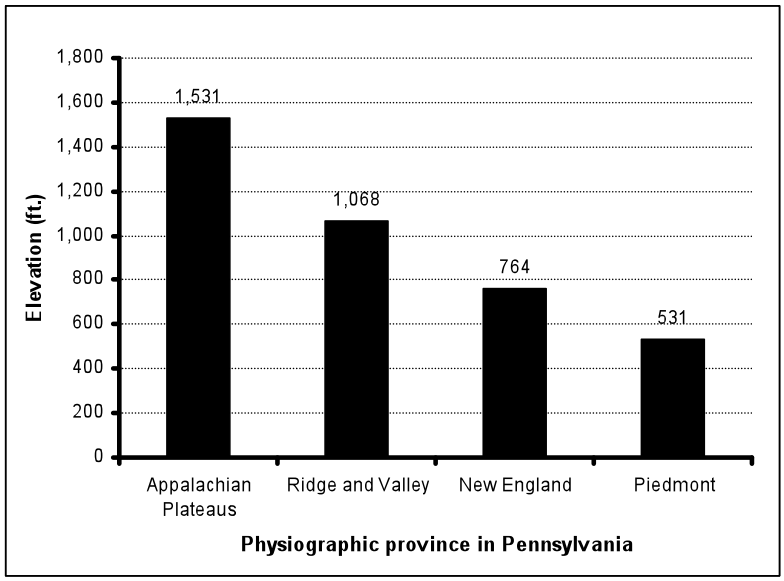

Figure 14. Average elevation associated with ginseng in Pennsylvania relative to physiographic province.

Summary

• Indicator trees:

Top 5: Sugar maple, white ash, basswood, tulip-poplar, black cherry
Note: Regional variation exists w/ regard to indicator value of some species (e.g., sugar maple and tulip-poplar)

• Indicator shrubs and understory trees:

Top 5: Spicebush, witch-hazel, maple-leaved viburnum, multiflora rose, hop-hornbeam
Note: multiflora rose is not native to North America

• Indicator herbs:

Top 5: Jack-in-the-pulpit, Solomon-seal, enchanter's nightshade, bedstraw, mayapple
Notes: Most (all?) of top 5 species are "weedy."

• Indicator ferns:

Top 5: Christmas fern, rattlesnake fern, marginal wood fern, spinulose wood fern, evergreen wood fern
Note: Maidenhair fern is a commonly cited indicator amongst diggers and growers

• Soils:

Forest habitat soils vary greatly w/ regard to pH and fertility
Average pH is ~5.5 but range varies considerably
Calcium may be important
Soil texture should be loamy

• Site:

North or east facing aspects are best, but other aspects can be suitable if micro-sites exist that look favorable (i.e., indicators are present)

Acknowledgments and final comments:

Special thanks to the Pennsylvania Department of Conservation and Natural Resources (DCNR) Wild Resource Conservation Program (WRCP) for providing funding for this study. A more complete summary and discussion of these study findings will be available to the public in early 2009. Please write to Eric Burkhart to request a copy.

Additional ginseng habitat research is planned to begin during 2009 in order to improve the reliability and recommendations of specific ginseng habitat "indicators" in Pennsylvania and the region. If you are someone with ginseng (planted or wild) on your forestlands, you are encouraged to contact Eric Burkhart to discuss the possibility of including your location in future studies. All specific location information will be kept strictly confidential.

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About the speaker

Eric is Instructor and Program Director for Shaver's Creek Environmental Center, providing training and outreach relating to botany and horticulture. This includes teaching courses for the Penn State School of Forest Resources on agroforestry, woody and herbaceous plant identification, and nonnative invasive flora. Working with partners such as the Pennsylvania Department of Conservation and Natural Resources (DCNR), Eric also conducts research on native plants of economic and conservation importance (e.g., American ginseng and goldenseal) and offers practical guidance through related workshops and publications.

Eric holds degrees in Economic Botany/Ethnobotany (B.A, Idaho State University) and Horticulture (M.S., Penn State University), and is completing a PhD in Forest Resources (Penn State University). A native of the Pittsburgh region, he and his wife Lisa White live in Pine Grove Mills, Pennsylvania.

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ROOTS AND REMEDIES OF GINSENG POACHING IN CENTRAL APPALACHIA

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Introduction

Plant poaching has become an increasingly important issue on national parks and national forests. Timber theft exists on all of the 156 national forests and forest service personnel estimate anywhere from $10 million to $100 million worth of lumber has been taken from these lands (McLean, 1994). The poaching of cacti is on the increase in Western states and Mexico (Daerr, 2001), as well as Big Bend National Park in Texas (Talley, 2003). However, no detailed studies of plant poaching or specifically ginseng poaching within the Appalachian region have been conducted. Poaching threatens both wild and cultivated ginseng (U.S. Fish and Wildlife Service Ginseng Findings, 2000; Eilperin, 2005). Great Smokey Mountain Park officials in North Carolina estimate $5,320,000 worth of wild ginseng roots were poached from 1991 to 2000 and ginseng growers in Kentucky identified poaching as a major problem.

Muth and Bowe (1998) defined poaching as an act "that intentionally contravenes the laws and regulations established to protect wild, renewable resources, such as plants, mammals, birds, insects, reptiles, amphibians, fish, and shellfish" (p. 9). This research hopes to expand on this definition by including stakeholders' perspectives on the motives behind ginseng poaching and will consider underlying causes associated with the region's unique economic and cultural connection to ginseng.

The stakeholders affected by poaching include a broad spectrum of individuals. Some are closely associated with Appalachian communities, while others are often far removed from the historical and cultural background of this valuable crop. These stakeholders include: ginseng growers and gatherers, ginseng dealers, public land managers, law enforcement officers, lawyers and judges, researchers, and non-profit groups involved with rural outreach and education, and economic growth.

Stakeholders' perceptions of the causes of ginseng poaching affect their selection of methods of intervention. For instance, their perceptions may have an impact on the development of new laws and regulations pertaining to ginseng harvesting. The perceived effectiveness of current techniques used to curtail poaching influences local residents' decisions to commit to cultivating ginseng. Opinions about whether interventions are working sufficiently may also influence the U.S. Fish and Wildlife Service's determination of the sustainability of future harvesting and

exporting of ginseng roots. Ultimately, the long-term survival of this culturally significant and economically important Appalachian species, and the future of ginseng trade is dependent on uncovering the root causes of illegal harvesting and working to remedy them.

This research seeks to study the root causes and remedies of ginseng poaching in Central Appalachia. The research project accomplishes this goal through examinations of perceptions of the ginseng community. The main research questions are: What do stakeholders believe causes or influences people to engage in poaching? How do stakeholders perceive the effectiveness of current poaching interventions? Stakeholder perceptions of ginseng poaching and the methods used to thwart poaching have never been ascertained. Stakeholders' stories and opinions were elicited during interviews and Q methodology. These views are beneficial in illuminating contextual issues and problems, including inadequate laws, poverty, and a lack of resource ownership in the region. These issues may all influence or promote poaching in the region.

Previous game studies illustrate the inadequacies of methods of interventions. Ginseng poaching interventions are also insufficient at curtailing poaching. Poaching has plagued ginseng growers since the first ginseng gardens were established in the United States. Growers may choose different techniques to stop poaching then those enlisted by public land managers. This research also explores the perceptions of the effectiveness of the interventions selected to curtail poaching.

The results of this research will help inform both ginseng growers and public land managers trying to sustain wild ginseng populations in Appalachia. Hopefully, this research will also serve to inform policy makers and law enforcement officers by revealing some of the flaws in unsuccessful methods used to deter poaching. If stakeholders' concerns are better understood, it may lead to more effective intervention programs, result in lower incidents of poaching, and help preserve ginseng populations in the region's forests.

The methodology for this research relied on historical analysis, in-depth interviews, and Q sort analysis. The first step of the methodology involved the use of historical analysis to layout the historical context surrounding ginseng poaching. The second phase used a series of in-depth interviews to provide clarity and background information, as well as supply the discourse from which Q sort statements were later selected. Next, a Q sort analysis was conducted to expose specific stakeholder perceptions related to the causes or motivations for poaching. The final phase of the research asked participants to rank specific categories of reasons to poach and categories of reasons not to poach. Additionally, they were asked to discuss the efficacy of current interventions used to address poaching and the relationship between motivating factors and the interventions chosen.

Q methodology, invented in 1935 by British physicist-psychologist William Stephenson, provides researchers with a systematic and quantitative means for examining human subjectivity. It encompasses factor analysis techniques and aims at preserving self-reference. In Q methodology, a person performs a Q sort, that is, he/she is supplied with a group of statements pertaining to a topic and subsequently ranks these statements from ones that are most like the way he feels (+4) to ones that are less like the way he feels (-4). The statements are ranked entirely based on the sorter's point of view. When the sorts are analyzed using a computer

program, specific perspectives (points of view) about the causes of poaching are produced. These perspectives or "factors" are presented in the following discussion.

Results of Q Methodology

A total of twenty-three participants were selected to perform a Q sort analysis. Five of the twenty-three sorters were women, four sorters were from Kentucky, nine were from Ohio, four were from West Virginia, two were from North Carolina, one from Pennsylvania, one from New York and two from Virginia. Sorters were chosen to try and maintain diversity and also to try and represent the stakeholder groups. Five sorters were public land managers, five were grower/gatherers, two were lawyers, four were ginseng buyers, three were law enforcement officers and four were listed as others. Participants were not asked about their ages but sorters' ages ranged from approximately late twenties and to late seventies.

Q Sort Process

Respondents were first given the conditions of instruction, which informs the person how he/she is to sort the cards. They were asked to think about illegal ginseng harvesting in Central Appalachia and what contributes, influences, or causes these activities. They were asked to read through the stack of 34 statements on 3 X 5 inch cards, keeping in mind what might cause, contribute to, or influence someone to harvest/collect/gather illegally, and place the cards into two stacks, ones they feel most like and ones they feel least like.

They were asked to further delineate between levels of agreement and disagreement by selecting two cards they most closely agreed with (+4) and two cards they least agreed with (-4). Eventually they had to place all the cards on the Q sort board with nine columns ranging from the far left being least believe like (-4) to the far right being a place to put most believe like statements (+4). These sorts were analyzed using Q Software and the results yielded four perspectives.

Exercise to Determine Top and Bottom Three Reasons to Poach

After performing the Q sort exercise, respondents were questioned about specific reasons to poach and interventions used to mitigate poaching. Because of time constraints of some of the sorters, only 19 sorters took part in this final exercise. The final exercise used the broad categories of reasons to poach collected from the initial interview data. The results of this ranking exercise are contained in Table 1.

Discussion of Interventions

Participants were then asked to read through a final packet of 17, 3-inch cards containing descriptions of various types of interventions used against poaching. These methods of intervention were taken from the initial interview data and are listed in Table 2. Respondents

were asked to discuss what they considered to be beneficial methods of poaching intervention. The results of this exercise were recorded and are discussed in the results section.

Perspective A: Historical Traditional View

People who hold this perspective are grounded in a historical view of private property rights and traditional harvesting practices. Individuals from this perspective believe that 100 years ago landowners didn't worry about private property laws and people harvested ginseng in rural areas walking across land that belonged to someone else; this culture is still present today. This person also feels older diggers do what is right to keep the plant on the landscape and harvest it in a sustainable way. In line with their belief of traditional harvesting practices, this perspective has a strong opinion about mountaintop removal and believes it too is a form of poaching; taking ginseng from the next generation. In contrast, this perspective also holds the opinion that practices committed by younger poachers today are not sustainable and when presented with an easy way to get money, these people will get on their 4 wheelers and quickly access the forests. Using their 4-wheelers, they can get into and out of the woods, and in just a few hours, can dig a couple hundred dollars worth of ginseng.

Another attribute associated with this factor is ambivalence towards poachers. The poacher is not entirely to blame; this is the lifestyle of folks who grew up in the region. This perspective believes there are people who don't even know that a season exists or that ginseng is regulated, and disagrees with the idea that the hillbilly is going to lead to the destruction of this poor plant. Instead, someone from this perspective assigns a portion of the responsibility for poaching to ginseng buyers who are the real link in the issue because someone has to be buying illegally harvested ginseng.

Finally, this perspective is realistic and recognizes that even if growers and buyers are somewhat ignorant of laws, they don't feel that private property laws should be ignored because ginseng diggers don't believe in property rights and don't acknowledge that poaching exists. In addition, one does not agree that people have rights to ginseng on certain sections of ground because their family owned it or their grandfather owned it years ago. This perspective does not let poachers off the hook just because some people don't own their own land and claim to have no other choice but to seek out land where they can find ginseng. Poverty is not an excuse to poach or circumvent the laws simply by claiming poaching is one of the few ways that poor people can bring in money.

Perspective B: Criminal View

There are two major elements associated with this perspective. A person who embraces this perspective by far has the strongest negative view of all four perceptions of poaching. He/she perceives anyone involved in an aspect of poaching as someone engaged in an illegal activity. He/she also believes this behavior is driven primarily by the monetary value of the plant. Commercial gain is a key point with this group. Persons in the group believe poaching is stealing from someone's private property and there's no justification for that, it is thievery. People who poach ginseng would also do other illegal acts like shoplifting because for them it's just another way to get money for illegal things such as drugs or to get a quick buck. This perspective also

holds buyers responsible for their involvement as they too benefit commercially from the act and are the real link in this issue; someone has to be buying illegally harvested ginseng. There is a lack of accountability and interest of buyers/exporters to buy and sell only legally obtained ginseng. They are reluctant to enforce a "chain of ownership" to trace ginseng roots back to individual harvesters.

The animosity towards those involved in poaching is obvious in this perspective. These people believe poachers know exactly what they are doing; poachers are aware of the laws even though they may claim they are uninformed. A person within this perspective does not believe poachers are justified to poach simply by claiming a traditional entitlement to ginseng or by saying they do not believe in private property rights. They disagree with the sentiment that God put ginseng there for them to take. A respondent from this group does not feel local people have rights to ginseng just because they dig on land that was once owned by grandpa or a member of the family who helped keep it growing there. Finally, a person from this group does not feel these poachers are just folks who live off the land hunting deer and digging ginseng, but instead believes these people are criminals.

Perspective C Failure of Laws

A person who holds this perspective strongly agrees the lack of legal repercussions is a major factor in poaching. Some of the contributing factors that fail to prevent someone from poaching include the lack of teeth in existing ginseng poaching laws and the often-lackadaisical attitudes of prosecutors and judges overseeing poaching cases. The almost nonchalant attitude of the legal profession such as judges and prosecutors, may be according to members of this perspective, due to a lack of understanding of the gravity of the poaching problem, the sensitive biology and ecology of the species, and the economic value of ginseng. Judges and lawyers don't think ginseng poaching is a real crime when it is in fact stealing from someone's property and taking someone's livelihood.

This perspective also cites inadequate laws as a weak link in state ginseng programs. Ginseng laws are not uniform state to state and therefore not uniformly enforced. There are no teeth in the state laws to protect ginseng and to prosecute violators. Unlike, perspective A and D, this group believes that the U.S. Fish and Wildlife Service is too lenient on states about how they handle their ginseng programs. People in this group also believe ginseng diggers who collect ginseng illegally only get a small fine for trespassing. They cite the small amounts of funding given to state ginseng programs, and the lack of resources available to police and rangers as part of the problem. These enforcement agents don't have the resources to get poachers or enforce the laws.

People in this group have the opinion that there are other ways to acquire ginseng legally such as obtaining a permit from the U.S. Forest Service to dig ginseng on forest lands or cultivating your own ginseng. Although they believe the local people in the region wouldn't completely extirpate or exhaust this species, they disagree that it is OK for ginseng diggers to ignore rights of others by harvesting ginseng from coal land without seeking permission first and ignoring private property laws.

Perspective D Poverty and Drugs

In contrast to perspective B (which takes a very negative and unforgiving view of people who poach), a person in this group does not hold the view that poaching in the region is an act committed by greedy, unscrupulous individuals. Instead, this perspective tends to examine social issues in the region, such as poverty and drug rings, and views these issues as motivating factors for ginseng poaching. A person with this perspective does not let people off the hook for poaching. It is still thievery and people know the laws, but this perspective takes a more understanding stance of why a person might be motivated to poach ginseng. Illegal ginseng gathering is just a symptom of a larger problem. This perspective's view of poaching is as a way for the poor in the region to bring in some money and feels that if other options existed, such as other jobs, people would not be so inclined to poach. A person with this perspective does not portray poachers as folks who just jump on their 4 wheelers and ride through the woods easily nabbing a couple hundred dollars worth of ginseng.

This perspective is the only one of the four major perspectives that really stresses the connection between illegal drugs and ginseng poaching, and points out that folks who have a drug problem in rural regions of Appalachia will do just about anything, including poaching, to get drug money. In addition, this perspective compares the poaching done by locals and older diggers who practice sustainable harvesting to get money for their family, as less offensive than the taking of ginseng done by coal companies accessing coal seams through the practice of mountaintop removal. Local harvesting will not lead to the demise of the plant. Unlike subsistence poaching, done for survival, destruction of ginseng by mountaintop mining is seen as a more offensive act. It not only destroys ginseng but it destroys entire ecosystems and future harvests of ginseng by the next generation of Appalachians.

A person in this perspective may not believe people have a tradition right to dig ginseng simply because it is growing on land once owned by grandfather or because it was put there by God. He/she also places some of the blame on landowners who should expect to have some ginseng harvested if their land is not fenced off or posted, after all, considering the poverty in the region, that's not really poaching.

Overall, this perspective believes it is easier to pick on a small group of under-represented people (local gatherers) rather than go after coal companies who may be destroying the species. They are more reluctant than any other perspective to blame the lack of legal repercussions for poaching. This group tends to side with the poor folk in the region, believing the laws, in addition to being hard on the locals, really do not address the root causes of poaching. Unlike perspective C, they don't believe that the U.S. Fish and Wildlife Agency is too lenient on states about their ginseng programs, or there are no teeth in state laws or that judges and lawyers don't take the crime seriously.

Consensus Statements

All four perspectives strongly disagreed with the statement that there are no private property rights as well the idea that it was acceptable to dig ginseng on property formerly owned by the family. They moderately disagreed with the viewpoint that local people would take ginseng to

buy beer and cigarettes. All perspectives moderately agreed that today, 'sangers are not replanting berries as they once did or that publicity will increase poaching.

Listed below are the results of stakeholders ideas about the top reasons that lead to poaching. Each person chose his/her top three reasons they believed caused one to engage in poaching.

TABLE 1

Ranking of 13 categories of reasons to poach.

Category	*Ranking (each participate had 6 votes)*
Commercial gain	24
No legal repercussions	19
Need money for family	16
Lack of respect for private property	13
Traditional right of use	13
Access to land	9
Easy to do	8
Accidental	5
Way of life	3
Ignorance	3
Sport	2
Rebellion	0
Trophy	0

Effectiveness of Interventions

When asked during interviews about what types of interventions work to stop poaching, the ginseng community generated a list of techniques (see Table 2) that range from low-tech methods to expensive, high tech methods. People who agreed with Perception A, that ginseng poaching was linked to historical, traditional practices, stressed a two-step process to address poaching. This group felt generations of local residents have treated the land as a commons and they roamed onto others' property harvesting ginseng as they did 100 years ago. For Perspective A people, deterring poachers is vital. Having landowners patrol their property and mark property boundaries with signs and fences can accomplish this. In addition, people need to mark their roots by using systemic dyes thus; enabling inspectors to detect illegally harvested roots. Finally, Perspective A suggests the encouragement of sustainable harvesting practices. Supporting programs such as Rural Action's "Grow it- Don't poach it" and offering incentives to grow ginseng are beneficial. They support educating the public and involving them in ginseng regulations.

Perspective B felt strongly that poachers were just criminals out for commercial gain. The most frequently suggested intervention technique discussed within this group was to educate judges and lawyers about the seriousness of the crime, especially the monetary value of cultivated ginseng crops. Increased use of fines to deter poachers and more funding for state ginseng management programs was also suggested. Finally this group felt that ginseng gatherers should be required to obtain a license for harvesting on public property.

Perspective C believes the inadequate enforcement of laws and regulations contributes to poaching. Poachers are aware of the weaknesses of the legal system and continue to poach. Bernice, a person who works with ginseng growers, feels the rules for buying and selling ginseng have to be the same state to state. However, rules involving harvesting ginseng need to be promulgated based on eco-regions rather than based on the states' individual laws. Ginseng harvest dates need to be determined by scientific studies on when ginseng seeds are mature and not decided by where (on the map) the plants are located. Plants may be in the same state yet ripen two weeks earlier because they are located in the southern part of the state.

Bernice also believes the severity of fines and jail time should be based in part on the motivations that cause the poaching and the amount of plants poached. In other words, if a person is poaching large amounts of plants, he needs to be fined more than a person poaching a pound of roots.

Every respondent in this group suggested the use of educational programs as a way to inform both the public and the legal community about the value of the plants and the seriousness of poaching. It harms the species, harms the economy of the community, and harms the individuals cultivating the plant. An Ohio public land manager said, "Educating the judicial system, especially the people in the upper levels, is a must. These people didn't attend biology classes and don't understand medicinals and things like that. Also a lot of people who do harvest correctly aren't given credit for passing on information to generations about replanting seeds and this needs to be stressed for sustainability."

The people in Perspective D believe poverty plays a key role in poaching, and suggested incentive programs to help local people grow their own ginseng. A dealer in this group said, "We need transparency with ginseng. It's been treated secretively for too long. We need to become an industry like every other industry or agricultural crop. Secrecy doesn't stop poaching and it won't get us [ginseng community] more funding for research and interventions. Extension agents need to be educated in the use of agro forestry and they can assist local people in growing their own plants. There's not near the wild crafting [harvesting plants from the wild] done that there use to be. Folks don't know near what they use to about them [plants]. I don't think putting a moratorium on harvesting in national forest works either. It just hurts the honest people.
He also said, "People have been stewarding this resource for years. I've been in the business for 30 years and the herb business gets bigger every year. There's more ginseng thriving in the world today than 200 years ago. People came here [Appalachia] to try and scratch out a living in these mountains and then now suddenly people want the land for coal and developments and so people become poachers. They make meth in the national forests and now find out they can make money on ginseng."

TABLE 2

Interventions used against poaching

Programs like Rural Action's "Grow it don't poach it
Fines
Fences
Motion detectors and cameras
Post Land
Patrol land
Offer other jobs
Cut leaves from plants to disguise ginseng
Dogs
Dyes
Encourage public involvement with ginseng regulations
Educate public about regulations and laws
Hot Lines (1-800-POACHER)
Get more money for state ginseng programs and enforcement
Offer incentives and support to allow people to grow their own ginseng
Licenses
Educate judges, lawyers about seriousness of ginseng poaching

Summary

Policies and laws surrounding ginseng harvesting and trade are numerous and complex. Many people involved in the trade of this plant cite the complexities and variations of laws, especially state to state, as problematic when it comes to dealing with ginseng poaching. States differ dramatically in both the severity of fines and imprisonment associated with poaching as well as the funding provided to enforce these laws and regulations. Dealers must comply with extensive paperwork, as do growers in some states.

In addition, regulators, such as local law enforcement officers and public land managers, point out the lack of sufficient funds and manpower to police often enormous tracts of public land containing ginseng populations. Many in the ginseng community view the lack of funding of state programs as a major loophole allowing poachers to roam freely across public and private lands in search of ginseng to poach. Although the top tier level of policies and laws dictates severe fines (CITES and ESA), insufficient funding and inadequate local prosecution, along with financially unenforceable federal mandates, do little to protect threatened populations.

Finally, an overall lack of understanding of the scope of the problem and value of the plant has led many to believe the problem is viewed as insignificant by many judges and lawyers on the local and state levels. While many scientific studies have been conducted to ascertain the viability and quantity of wild populations, as well as sustainable harvesting practices, many in

the ginseng community, including diggers, fail to abide by or are unaware of the current harvesting regulations and overall status of the plant.

Recommendations

Given the differences between all four perspectives it is obvious that a lack of understanding of laws, poverty, and traditional practices of harvesting may be contributing to a failure to curtail poaching. Education of the general public as to the significance of this species both economically and culturally is important, especially education on sustainable harvesting practices. Additionally, law officers, extension people, and the legal community should be informed about the economic value of the plant and the severity of poaching. Finally, one respondent stressed the need for this industry to become transparent. Secrecy has not afforded ginseng or ginseng growers protection. Certification procedures and additional funding and support can aid public land managers and growers who are trying to legitimize commerce of this medicinal plant.

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About the speaker

Randi was born and raised in the upper Ohio Valley and currently lives with her husband in southeastern Ohio. She has a varied background that includes both educational training and work experience in Environmental Engineering, Chemistry, Secondary education, and Environment and Community. She has recently completed a doctorate degree in Environmental Studies dealing with non-timber forest products and ginseng.

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FOREST FARMING OF GOLDENSEAL, BLACK COHOSH AND OTHER NATIVE MEDICINAL FOREST PLANTS

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Here we will provide you with two perspectives on forest farming of woodland botanicals. I am Jeanine Davis and I am a researcher and extension specialist located in the mountains of western North Carolina. My program objective is to help save native species that are used medicinally by bringing them into cultivation. I am also trying to develop new income opportunities for farmers and forest landowners in the Southern Appalachians by developing new crop opportunities. As such, I am interested in developing economically feasible production systems and working with crops for which there is a healthy market. John and Michele Kershaw are farmers located in Ontario, Canada. They like to try new things and have operated a goat dairy and grown ginseng. They are now large producers of medicinal herbs, both sun-loving herbs, such as Echinacea, and forest herbs. John and I have known each other for a long time and talk on the phone three or four times a year to compare notes on growing and marketing medicinal herbs.

A RECAP OF OUR PRESENTATION AS TOLD BY JEANINE DAVIS:

The objective of OUR presentation was to discuss research and extension activities that have taken place in western North Carolina and compare them with the "real world" experiences of a large commercial grower in Ontario. A couple of points that we wanted reinforce were:

- don't rely on a single source of information
- how plants respond to certain practices can vary greatly from location to location
- keep it simple and efficient
- know who you are going to sell your crop to or how you plan to sell it before you plant
- networking is very important in this industry.

John and I live and work in very different places. John is from an agricultural region of Ontario where farms are large and flat. I live in the mountains of western North Carolina where farms

are very small, there are lots of woods, and flat land is limited and often targeted for development.

The first plant we discussed is a favorite of both of ours, **goldenseal** (*Hydrastis canadensis*). Goldenseal is native to hardwood forests of North America. It has a long history of use, and concern about harvest pressure on wild populations was expressed as early at the late 1880s. Large-scale cultivation first took place in the Pacific Northwest in 1905. That early industry died out sometime in the 1940's, probably due to disease problems, and the industry returned to sourcing almost exclusively from wild-harvesters. In the early 1990s, real concern over wild populations arose again and in 1997 goldenseal was listed on the Appendix II of the Convention for International Trade on Endangered Species of Wild Fauna and Flora (CITES) and interest in cultivation arose again. Although cultivated material makes up a larger portion of the goldenseal sold each year, the majority is still wild-harvested.

Goldenseal has a perennial rhizome with a mass of fibrous yellow roots. This is the plant part of economic interest. Goldenseal can be propagated by rhizome cuttings or from seeds. The small, shiny, black seeds develop in a raspberry like fruit. Once harvested, the seeds must be kept moist until they are planted. There are three major alkaloids that are considered important for the medicinal quality of the roots. These are berberine, hydrastine and canadine. Berberine gives goldenseal roots their bright yellow color and bitter taste. Goldenseal has many uses, including use as a topical antiseptic, to help boost the immune system, to reduce inflammation, to increase the efficacy of other herbs, and to (supposedly) mask illegal drugs in urine tests.

My staff and I have conducted research on optimizing commercial production practices for goldenseal in western North Carolina since the early 1990s. We are particularly interested in how production practices affect bioactive constituents. We have also studied the economics of production and worked on developing markets. In one of our first studies, we looked at the influence of soil pH, nitrogen, and phosphorus on growth, root yield, and alkaloid content of goldenseal roots. We found that, in general, there was little response to nitrogen or phosphorus, but that soil pH was very important. After Bob Beyfuss from Cornell reported his findings on the response of ginseng to soil calcium, we also looked at how goldenseal would respond and found that goldenseal growth decreased with increasing soil pH. We also studied organic mulches, plant spacing, shade levels, and methods of propagation. The results of all of these studies, and those described below, are summarized in the book I coauthored with Scott Persons. Information on the book is provided below.

John and I compared goldenseal production in North Carolina and Ontario. In North Carolina, most of the goldenseal is grown in the woods in a wild-simulated or woods cultivated method. In contrast, in Ontario, most of the goldenseal is grown intensively under artificial shade cloth. John shared some ideas he had for improving production, including trying direct seeding in August and using beneficial bacteria.

Vestal Shipman grows goldenseal in the woods in Tennessee.

John Kershaw's goldenseal under shade in Ontario.

Bloodroot *(Sanguinaria canadensis*) is an herbaceous perennial that is almost entirely wild-harvested. It was traditionally used as a dye, to treat skin lesions, and to prevent tooth decay. Currently, it is being used as an appetite stimulant in cattle feed and is showing great promise in cancer studies. The active constituent in bloodroot is believed to be the alkaloid, sanguinarine, which does have proven anti-microbial properties. Bloodroot can be propagated by seed and rhizome cuttings.

A few years back, demand for bloodroot was increasing and many people were asking us about how to grow it. We knew next to nothing about the production and economics of bloodroot, so some graduate students, faculty, and a non-profit organization collaborator began some studies. We looked at propagation by rhizomes and seeds, chilling requirements to break dormancy on the buds, tillage systems, and companion planting with other woodland medicinals. We learned how to grow bloodroot on a commercial level, but the economics of production were not favorable. Bloodroot grows slowly, and until prices increase quite a bit, it will not be economically feasible to grow bloodroot for sale on the wholesale raw materials market.

As John reports below, he and Michele did not have much success with bloodroot and also found the market unfavorable for production.

Black cohosh (*Actaea racemosa*) is another herbaceous perennial that is native throughout eastern North America. It is a woman's herb and is in high demand for treatment of unpleasant menopausal symptoms. It can be propagated by rhizome division and seed. There is some cultivation underway, but much of the black cohosh on the market is still wild-harvested.

A group of us became involved in black cohosh research at the same time, including a graduate student at Clemson, other faculty at NC State, and a private industry partner. We conducted research on propagation, seed handling, diseases, use in companion planting, and growing in an

aeroponic system. We found that black cohosh is very easy to produce and grows much faster under artificial shade than in a natural wooded setting. Unfortunately, prices paid for black cohosh on a wholesale market are so low, that it would be very difficult to make any money producing it unless it was grown on a very large scale.

For John, the economics of scale might pay off for black cohosh and it is a plant that grows well in his system. He makes more comments about black cohosh in his section below.

False unicorn (*Chamaelirium luteum*) is another favorite plant of John and mine. It is fairly rare in the wild and grows slowly. It is primarily a woman's herb, but is used for other purposes including treating pain and to stimulate appetite. The prices offered for false unicorn are high, but the volumes purchased are low. Commercial production of the plant is just started, but many people are having trouble growing it from seed and can't afford to buy rootstock. In my experience, it grows better in woods than shade. John is successfully growing false unicorn under artificial shade.

The next five plants are ones that I have done some research on and are grown by small-scale producers in my area.

Mayapple *(Podophyllum peltatum)* is a native plant with a long history of use to treat liver problems, cancer, constipation, and other disorders. It is easy to grow and to propagate from rhizome cuttings. There is some exciting research being conducted in Mississippi on mayapple right now, but that has not yet translated into a high demand. Mayapple is also a desirable landscape plant for wooded areas.

Wild ginger *(Asarum candense)* is an attractive, lowing growing plant that prefers cool, shaded, moist woods. It can be propagated easily by division. There is some controversy about its use and safety, but there still is commercial demand for the plant. It is used, among other things, as a stimulant and to relieve gas. This plant makes a beautiful ground cover, and as with many of these plants, can be sold as a landscape plant for shaded areas.

Blue cohosh *(Caulophyllum thalictroides)* is a slow growing plant, but it is easy to propagate from divisions or seed and not difficult to cultivate. It is another woman's herb, sometimes used in childbirth. It is also a beautiful landscape plant. There is no large-scale commercial cultivation being done that we are aware of.

Bethroot *(Trillium erectum)* is a trillium with a beautiful little flower. The roots are used medicinally for their astringent properties and to treat internal bleeding, among other things. The current demand for the plant is low, but new research being conducted in North Carolina might change that.

Ramps *(Allium tricoccum)* are not technically medicinal herbs, but they are native, are wild-harvested, and were traditionally consumed as a spring tonic. Ramps have recently become popular at mountain community ramp festivals in the spring and by celebrity chefs. Since the plant is almost exclusively wild-harvested, this raises big concerns about native populations.

Little was known about growing this plant when the US Fish and Wildlife Service asked me to study how to grow it and to teach others how to do so.

With the advice of the one and only ramp farmer I could find at the time, Mr. Glen Facemire in West Virginia, my staff and I set out to create a series of studies on soil pH and soil calcium, fall versus spring planting, shade level, and seed germination. We also established 26 on-farm trials. There are now small-scale ramp producers all over the eastern half of North America and ramps are showing up in all kinds of new value-added products.

How Jeanine works with medicinal herb farmers: We have a long-term project, now in its fifth year, called the Medicinal Herbs for Commerce Project. It was designed to evaluate if North Carolina farmers could grow medicinal herbs on the scale and of the quality to be competitive on a global market. We worked with 40 farmers across the state to grow a wide range of herbs. Six buyers advised us on what herbs to grow and how to dry and package them. We provided step-by-step instructions on how to grow the plants and were present for all the important tasks, such as starting transplants, planting the field, harvesting, drying, and selling. One of the things we realized pretty quick was that growers in the eastern part of the state had ready access to propane-fired tobacco barns that were perfect for drying herbs. In the western part of the state, however, we grow a different kind of tobacco that is dried in large open-air barns. These are not good for herbs. We soon found ourselves designing and building herb dryers! We designed two kinds; a very small unit that uses a baseboard heater for the heat source and a small desk fan for air circulation, and the large one shown in the pictures. The main structure for these are utility buildings that are produced locally and made with a few modifications we requested and with materials safe for herbs.

Two views of an herb dryer built from modified utility buildings.

We've also developed a series of enterprise budgets for herbs that are based on our research and real farm experiences. We try to update these budgets as prices change and new information becomes available. Growers are particularly interested in yield estimates. These are really hard to provide because when it comes to woodland herbs, everyone grows them differently. Size of beds, number of beds per acre, etc. are always different. With that in mind, however, here are

some yield estimates we have for a few medicinal herbs. This includes woods and artificial shade production. Expect that the lower yields would be obtained from the woods and the higher yields from shade structures. These are estimates based on information from research and growers' experiences in western North Carolina:

- Ginseng, wild simulated: 160 pounds
- Ginseng, woods grown: 600 pounds
- Goldenseal: 500 to 1,600 pounds
- Black cohosh: 750 to 2,500 pounds
- Bloodroot: 1,000 to 1,500 pounds

To help farmers with marketing their herbs, we've conducted surveys of N.C. medicinal herb growers, buyers, manufacturers, and consumers. We also commissioned a report to examine the economic feasibility of medicinal herbs as commercial crops in NC.

In North Carolina, we've come to the conclusion that we can't compete on the global market in volume or price. Our market niche is to provide high quality cultivated herbs. We encourage our growers to produce certified organic herbs and have them tested for heavy metals, pesticides (where necessary) and for bioactives (when appropriate). We also educate farmers about the new FDA cGMPs (current Good Manufacturing Practices) for Dietary Supplements and how they can help manufacturers by producing herbs in a manner that will help them meet the new regulations. We also promote good handling and storage practices.

Because it can be difficult for a farmer to find a market for his/her herbs, we have created buyer-grower directories and one of my employees serves as a marketing assistant for the local industry. She maintains close contacts with many buyers and growers and helps connect the two where appropriate. Because she has been on every one of the farms and knows all the growers, she is in a good position to recommend particular farmers to grow specific crops. We also encourage farmers to look at all the market opportunities, including wholesale raw material buyers, direct to manufacturers, Internet sales, direct sales to consumers, and making value-added products.

We have created growing and marketing guides, websites, and started a new association and support an existing association:

- http://ncherb.org
- http://ncmedicinalherbs.org
- http://ncspecialtycrops.org/medherbs
- The NC Natural Products Association http://ncnaturalproducts.org
- The NC Herb Association http://ncherbassociation.com

All of these herbs are covered in the book "Growing and Marketing Ginseng, Goldenseal, and Other Woodland Medicinals by W. Scott Persons and Jeanine M. Davis, 2005 (updated in 2007). Published by Bright Mountain Books http://brightmountainbooks.com.

A LITTLE HISTORY OF OUR HERB GROWING BUSINESS AND ADVICE TO NEW GROWERS BY JOHN KERSHAW:

We started to grow goldenseal in 1996. Our first three plantings were 1/3 of an acre. In 2000, we increased our plantings to 1.2 acres of goldenseal and 1/3 of an acre of black cohosh, false unicorn, and bloodroot. We've expanded almost every year since.

Over the years we have had both successes and failures growing herbs. For example, our first planting of bloodroot in the fall of 2000 never came up. Because the market for the root never materialized, we haven't tried growing it again. Another local farm has been growing bloodroot since 2000 and they have had limited success with the plant.

As we expanded over the last eight years we were introduced to *Echinacea angustifolia*. Our first planting was a big success and we have been growing it commercially for the past six years. We are currently growing goldenseal, black cohosh, false unicorn, *Echinacea purpurea*, *Echinacea angustifolia*, and *Echinacea tennesseensis*. We have always tried to grow according to our established market demands. Generally we only grow what we have orders/contracts for. We try not to grow on speculation. During the first three years of planting goldenseal we contacted various companies with regards to buying our root. We try to establish good working relationships with the companies. We found that we cannot rely on middle vendors to buy and sell our product(s). From what we have observed with ginseng (*Panax quinquefolius*), when you rely on middle vendors, your farm becomes a warehouse for the buyers and your money is in the barn not in the bank. This doesn't maximize your profit. By building relationships directly with the processing companies' buyers, they give us advice and suggestions on what to grow, and in turn, they then purchase those herbs from us.

Over the years we have also tried to establish contacts with Universities to keep informed on the latest growing techniques and current research. I make frequent calls to researchers in order to keep abreast of new knowledge. Networking is very important in this business. I have never professed to know more than I do and I am not afraid to ask a researcher, a company, or a successful farmer for advice.

We have grown ginseng with black cohosh and had good success, but the price of cultivated ginseng made us discontinue this practice. It was interesting to note that the value of wild ginseng crops this year is almost equal to the entire Ontario cultivated crop! Prices in the fall for three year old ginseng were in the $15.00/pound range, now it ranges from $10-$12/ pound.

Set-up of Garden

At the present time, we grow almost all our shade herbs under artificial shade structures. The shade cloth we use has a 78 percent shade value. Our shade beds are set-up to similar specs as commercial ginseng in Ontario. Our soil is a sandy loam with a pH range of 6.5 to 6.8. We make sure the potash levels are high. The goldenseal plants thrive on potash in our area of Ontario. We have grown goldenseal in the bush (woods) naturally, but after 12 years in the bush the roots are not as large as three year old transplants grown under artificial shade! So, for us, it

is just not economical to grow in the bush. We use oat, rye, and wheat straw for mulch, however, our preference is oat straw.
We plant goldenseal rootlets on a 6 inch x 6 inch spacing in raised beds. The rootlet pieces are ½ inch chunks of root with a minimum of one bud. We try to keep 3/8 inch to a ½ inch of fiber on the rootlets. We have tried planting seed, however, this has given us varied results. The method that seems to work best for us is cleaning the seed immediately after harvest and planting the seed right away. We have repeatedly tried planting seed in the fall with little success, but when we plant right away we have good germination (Jeanine's research has shown the same thing). We are going to continue with this method of seed planting with the goal of reducing or eliminating labor costs from transplanting.

Harvesting
Meeting company quality specs for the crop is very important. We have fine tuned our harvesting and drying methods to achieve the highest medicinal value and quality, which may be defined differently for each company. This has been a trial and error process that you have one shot at with each crop during the digging, cleaning, and drying processes. We keep records of all changes we make and the effects they have on the chemical analysis, which the companies provide us with. The amount of time the roots are out of the ground after digging, the volume of water used during washing, and the temperature for drying all can change the quality and chemical analysis of your product.

Summary
To new growers getting into this industry, here is our advice. The biggest contributors to success are to learn from your mistakes and network with lots of people. Keep in contact with people in the industry to know what is going on and how this might affect you. Be open to new ideas and doing things differently. You will be amazed at how small changes can make big differences. Try to do your own marketing directly to processing companies/businesses. This will maximize your profits. Be aware of the costs involved with growing the crop and try to keep things simple and efficient.

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About the speakers

Jeanine Davis

Jeanine is an associate research professor and extension specialist in the Department of Horticultural Science at N.C. State University. She is located in the beautiful mountains of western North Carolina at the Mountain Horticultural Crops Research and Extension Center near Asheville. For over 20 years, her program has been focused on improving the sustainability of farming by introducing new crops, developing commercial production systems for culinary and medicinal herbs, and improving organic production systems for vegetables. For the past nine years, she also coordinated the statewide, multi-agency N.C. Specialty Crops Program. Current projects include studying the influence of soils and environment on chemical constituents and bioactivity of Echinacea and ginseng and improving production of organic heirloom tomatoes.

She is a founding board member of the N.C. Natural Products Association and the Organic Growers School. She is also the coauthor of the book entitled "Growing and Marketing Ginseng, Goldenseal and Other Woodland Medicinals."

John Kershaw

John and his wife Michele reside in the community of Burford, Ontario, an area known originally for tobacco and American ginseng. They started growing goldenseal in 1996 and in 1999 partnered with close family and friends to expand into bloodroot, black cohosh and false unicorn growing projects. The Kershaw's currently have approximately 20 acres of goldenseal, black cohosh, and false unicorn under shade. In 2001, they began growing *Echinacea angustifolia* and in 2006, *Echinacea purpurea*. Their Echinacea acreage depends yearly on company orders, but since 2001 they have expanded their Echinacea acreage to 65 acres. They are currently in the process of certifying all farms organic.

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FROM GROWER TO URBAN PRACTITIONER: DIRECT MARKETING OF CHINESE MEDICINAL HERBS

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High Falls Gardens has been growing Chinese medicinal herbs since 1994 in Columbia County, roughly in the middle of the Hudson Valley, and about 135 miles from New York City.

In the year 2000, I organized a teleconference series for some of my counterparts around the country. We were aware of how some growers had gotten burned during the herbal products boom of the 1990s. But many of us still wanted to grow herbs, and to figure out a way to market them more effectively.

The Sonoma County Herb Association had gotten a grant to start a Herb Exchange, in which herbal practitioners would order herbs and drive to a CSA (Community Supported Agriculture) farm in Sebastapol to pick them up fresh. Leslie Gardner is still the director of the Exchange, and Peggy Schafer is the lead Chinese herb grower in California. They were on the teleconference series at the beginning, and still are a prime motivator for our new initiative, Local Herbs (www.LocalHerbs.org), which aims to sell domestically-grown Chinese medicinal herbs directly to licensed Oriental medicine practitioners.

Background

The developments that led to the Local Herbs initiative began around 1990, when Robert Newman, L.Ac., M.S.T.C.M. was a student at the American College of Traditional Chinese Medicine (ACTCM) in San Francisco. ACTCM had invited a Chinese professor to bring plants from China and plant a garden. This invitation led to the creation of the Chinese Medicinal Herb garden at the University of California Botanical Garden in Berkeley. Elaine Sedlack assisted in the planting and is still the curator there.

In 1994 I contacted Elaine, and she put me in touch with Robert. A natural plantsman and self-taught botanist, by then he had amassed a collection of over 700 species of Asian medicinal plants, mostly in seed form and obtained through botanical garden exchange programs. By 1997 Robert had distributed his collection to six other conservators around the U.S., including Joe Hollis of Mountain Gardens in Burnsville, NC, Peggy Schafer in California, Richo Cech of Horizon Herbs in Oregon and High Falls Gardens in NY. The "Newman Conservators" are the people who have managed the germplasm for the past fifteen years, and most of them currently sell to growers.

The medicinal herb consortium

Our teleconference series eventually included representatives of five medicinal plant growers associations: the Organic Herb Producers Co-op in Minnesota/Wisconsin, New Mexico Herb Growers Association, New York Grown Chinese Medicinal Herbs, Sonoma County Herb Exchange, and West Virginia Herb Growers and Marketing Network. Drawn from very different bioregions, these associations are able to grow and compare herb qualities. We recognized that this type of cooperation would be essential in our approach to the marketplace.

This network is known as the Medicinal Herb Consortium (MHC). Most of our associations are backed by nonprofit organizations. That fact points to the long-term support needed to assimilate the herbal knowledge of traditional Chinese medicine, and to find ways to sell our herbs locally with adequate compensation.

Over 90 small farms are represented by these associations. The MHC defined ourselves as *ecological* farmers, although most of us are certified organic. Ecological cultivation, as we purposely defined it, matches plants to ecosystems, seeks to imitate nature, nurtures biodiversity at all levels, increases bio-complexity, works for long-term gains, and leads or anticipates the market. Biodiversity leads to balance in the ecosystem, which enhances the quality of the medicinal plants harvested from it and leads to a superior product that enhances human health.

From a marketing point of view, our definition of *ecological* contributes added value to our products. Woodlands, also wetlands and drylands, provide many opportunities for wild-cultivation. Traditional Chinese medicine expands our ideas of what is a medicinal herb, beyond ginseng and mushrooms, to cat-tail pollen (*pu huang*), coltsfoot flower (*kuan dong hua*), and the "invasive" reeds that grow in wetlands (*phragmites rhizome* or *lu gen*), to name a few. A plant formerly considered as a worthless weed may take on added value if it is wild-harvested and sold as part of a Chinese medicinal herb formula.

Acupuncture and oriental medicine

In seeking a top-level market niche that would help us win a competitive advantage for our herbs, the MHC identified the profession of Acupuncture and Oriental Medicine (OM) in the U.S. and Canada. Based on 2,500 years of continuous, documented scholarship, OM features an initial text that has been translated into English, listing many herbs still popular today. The *Shen Nong Ben Cao Jing*, or Divine Farmer's Materia Medica, categorizes herbs according to superior (those that can be eaten by anyone, on a daily basis, or "food grade"), middle-grade (should be eaten sparingly and only occasionally) and inferior (toxic and should be taken only upon the advice of an herbal practitioner). In the OM system, herbs are usually taken in formulas that address all channels of the body at the same time in order to reduce or eliminate side effects. Considering the north temperate zone affinities between Asia and North America, plus the high degree of organization of the profession in the U.S., Oriental Medicine seems to be a good market for the ecological grower.

The profession comprises approximately 17,000 licensed practitioners, most trained in the U.S. Since 1970, the profession of OM has developed national certification, licensure in over 42 states, more than 50 private, accredited graduate schools outside the mainstream universities, one national professional association, and one major media organ, *Acupuncture Today*. The profession can be addressed easily and cost-effectively by the growers, working together in the MHC.

Peggy Brevoort, who with her husband Bill founded and sold East Earth Herbs, a traditional Chinese medicine formulator and product maker, went on to publish two marketing studies in *Herbalgram* in the late 1990s. She accurately foresaw the greatest challenges to the future of the herbal products industry as the synergy of the whole plant and the concept of the combination formula. In their desperation to develop new drugs, pharmaceutical companies have acquired many of the largest supplement companies and are introducing proprietary products based on Chinese herb formulas with FDA approval. Ecological growers are well advised to take the opposite tack, and strive to make their products as well-grown, whole and authentic as possible. An alliance with the profession of OM provides growers with a basis of true efficacy, will drive positive developments in the industry, and help win us higher prices for our products.

Asian medicinal plants

Of the estimated 30,000 known plant species of Asia, one-quarter (over 7,500 species) are listed in the current official material medica of the People's Republic of China. The English translation of the *Zhong Hua Ben Cao* lists only about 500 of these species.

Since the 17th century, botanists have noted a distinct similarities between the flora of eastern North America and eastern Asia. A reference book by Duke and Ayensu, *Medicinal Plants of China*, lists about 1200 species. Drs. Duke and Ayensu identified about 120 of these as "vicariads," analog species used in similar ways by Asians and native North Americans. The most famous analog pair, *Panax ginseng* and *Panax quinquefolius* (Asian and American ginsengs) are not vicariads because the Chinese found American ginseng to be cooling and a Yin nourisher, while the Asian analog is warming and a Qi tonic.

Examples of vicariad genera in common families are:

Asteraceae (Asters): Achillea*, Arctium, Artemisia, Aster, Carduus, Chrysanthemum, Cirsium, Eupatorium, Gnaphalium, Inula, Lactuca, Petasites, Senecio, Solidago, Sonchus, Taraxacum*

Lamiaceae (Mints): *Agastache, Leonurus, Mentha, Nepeta, Prunella, Salvia, Scutellaria, Stachys*

Ranunculaceae (Buttercups): *Actaea, Anemone, Clematis, Coptis, Paeonia, Ranunculus*

Rosaceae (Roses): *Crataegus, Geum, Potentilla, Prunus, Pyrus, Rosa, Rubus*

In addition to the analog plants, many Asian species have naturalized in North America, some purposely introduced as ornamentals. Common garden peonies found throughout the northern

U.S. and Canada are hybrids of the Asian species, *Paeonia lactiflora*, introduced through France in the mid-nineteenth century.

Examples of naturalized species that are Chinese medicinals include velvetleaf seed (qing ma zi), burdock seed (niu bang zi), knotweed rhizome (hu zhang) and, of course, kudzu root and flower (gen gen/hua). Common ornamentals that are Chinese medicinals include monkshood root (fu zi), mulberry leaf and fruit (sang ye, sang shen), lilyturf tuber (mai men dong), balloonflower root (jie geng), and silk tree bark and flower (he huan pi/hua).

The invasive species issue has been a noisy and highly polarized debate. Now, more moderate voices are being heard, some from the permaculture movement. The idea of a plant as "invasive" seems founded on assumptions akin to the germ theory of disease. Holistic medicine holds that a healthy organism is resistant to common pathogens present throughout the environment, while a malnourished or otherwise unbalanced organism is susceptible to disease. Similarly, in most cases of "invasion," the root cause is pollution or biodiversity loss. Spraying the invader with chemicals only makes the problem worse. Conservators and growers have access to good information, through databases such as that posted at www.alienplants.gov, and also have the most to lose through introduction of an expansive or dispersive plant species into their ecosystem. Such plants already present in relatively clean, off-road areas accessible to the grower can be wild-harvested and prepared for the market.

Domestic production

How can we be sure the domestically-grown plants are medicinally equivalent to the Asian products? Using descriptions of the plant species native habitat as a guide, MHC growers are comparing products from plants grown in different locations. Since biochemical analysis proves only species identification and the presence of contaminants -- not freshness, vitality or qualities of *terroir* related to local growing conditions -- another evidence-based method of analysis is being developed.

An affiliate of our Minnesota/Wisconsin group is adapting a "descriptive analysis" protocol for organoleptic (taste and smell) evaluation of food products for use in evaluating domestically grown Chinese medicinal herbs. Used in the food industry since 1970s, descriptive analysis compares several samples to a standard product. Graduate students are used as tasters, a lexicon (glossary of special terms) is established for each case, and the method yields replicable results.

The MHC carried out a planning project in 2004-05 that included a study of the feasibility of direct-marketing their products to licensed OM practitioners. We found that, despite price resistance expressed in interviews and questionnaires, practitioners became most enthusiastic when shown samples of fresh-dried domestic products. Each year since then we have presold a "Sample Pack," a carton of 32-37 small reclose able bags of different herbs, each carefully labeled including the farm of origin, to OM practitioners, colleges, and clinics.

We have just begun to take orders for herbs through the new MHC website, www.LocalHerbs.org. We are backlogged on orders and are attempting to raise $600,000 in working capital to pay for grower training and to guarantee prices for pre-contracting. The

website is very basic at present. We hope to develop it as a national portal for growers to sell to the OM profession, and for the profession to compare and evaluate products grown in different regions of the country. All products are pre-ordered at present. The growers will be pre-screened and trained, with farm identities featured. Development will be managed by nonprofit organizations, with a 5-10 year startup phase.

Marketing directly to the OM profession through LocalHerbs.org is only one aspect of the MHC's three-part strategy. We also expect to sell to local product makers under contract. Growers will be able to sell food-grade herbs into local food channels such as farmers markets, CSAs or U-picks. A current example of the food aspect is SunStar Herbs in New Mexico, which sells its *Ziziphus jujuba,* Chinese red dates, for $25 per pound at the Santa Fe farmers market.

Conclusion

Just recently we received good news: a $50,000 grant from the USDA for an Asian medicinal herb grower training program has been awarded through New Mexico State University. This prototype training program will focus on herbs appropriate to Southwest conditions, but we expect to adapt it to other regions of the country.

Growers who are seriously interested in Chinese medicinal herbs may receive suggestions on how to select and evaluate plants; please contact me through email. The MHC strongly advises that all growers work in cooperation with us for two main reasons: (1) The process of growing out the Asian herbs in different regions and comparing the results is a scientific, consensual activity, an important stage of a process that cannot be skipped over if we hope to build a successful industry, and (2) Growers must cooperate, rather than compete, to establish the highest ecological quality standards along with good local markets that reward our products with prices adequate to recoup the costs of production plus a profit.

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About the speaker

Jean directs High Falls Gardens (HFG), a farm-based, nonprofit enterprise founded in 1993 to advance the practice of traditional medicine in North America through cultivation and study of Asian medicinal plants. HFG's national Botanical Studies program supports the Colleges of Acupuncture and Oriental Medicine and their efforts to broaden clinical herbal studies with whole-plant access and related subjects. Activities include distribution of seeds and plants, lectures, internships, field workshops, research, publications, and teacher training. Jean coordinates the steering committee of the Medicinal Herb Consortium, five growers associations in different states working together to develop domestic production of Asian herbs. A contributing author of "Mending the Web of Life: Chinese Medicine and Species Conservation," she has also coauthored papers in the last two "New Crops" volumes. Since 1994 she has studied Chinese Herbal Medicine with Jeffrey C. Yuen in New York City.

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MEDICINAL PLANTS AND CURRENT GOOD MANUFACTURING PRACTICES (GMP)

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Introduction

Good manufacturing practices (GMPs) are used to ensure the quality of dietary supplements – a company must consistently and reliably manufacture what it intends. GMPs require written procedures detailing the specifications a manufacturer establishes for its dietary supplements and the production processes needed to achieve those specifications. GMPs require the creation of written documentation substantiating that procedures are satisfied and the specifications are met.

The key steps towards ensuring the quality of dietary supplements are ensuring the identity and quality of components used to manufacture a dietary supplement, and utilizing in-process controls to ensure that the product specifications are met. These two requirements permit testing of only a subset of finished batches of product, rather than testing of each finished batch. GMPs do not address the inherent safety of the ingredients used in dietary supplements, which is covered by other statutory provisions. Similarly, adverse event reporting requirements are not comprehensively encompassed within GMPs.

Implementation timeline

- Rule is effective August 24, 2007
- 500 or more FTE employees: Compliance date is June 25, 2008
- 20 – 499.x FTE employees: Compliance date is June 25, 2009
- Less than 20 FTE employees: Compliance date is June 25, 2010

Key requirements of the final rule

The GMPs apply to all domestic and foreign companies that manufacture, package, label or hold dietary supplements, including those involved with the activities of testing, quality control,

packaging and labeling, and distributing them in the United States. Each company involved in manufacturing, packaging, labeling, or holding dietary supplements is responsible for only those GMPs that relate to its activities.

The Final Rule is limited to only those involved with dietary supplements – it does not extend to entities that manufacture, package, label, or hold only dietary ingredients, or to persons engaged only in activities associated with the harvesting, storage, or distribution of raw agricultural commodities that will be incorporated into dietary supplements by other persons.

The Final Rule does not apply to retail establishments holding dietary supplements only for purposes of direct retail sale to individual consumers.

The Final Rule does not apply to practitioners that manufacture individualized product for specific individuals on a case-by-case basis.

Master manufacturing record

The creation of a master manufacturing record is central to the GMP scheme. This record serves as the touchstone for most of the other GMP requirements to ensure the quality and uniformity of all dietary supplements a company produces. FDA compares the master manufacturing record to a recipe, setting forth the ingredients to use, the amounts to use, the tests to perform, and the instructions for preparing the quantity the recipe calls for.

Production and process controls

Production and process controls are the means by which the master manufacturing record is implemented. The Final Rule requires companies to establish, through written procedures, a specification for any point, step, or stage in the manufacturing, packaging, labeling, and holding process where control is necessary to ensure the quality of the dietary supplement. Companies must provide adequate documentation for why meeting these specifications will help ensure the quality of the dietary supplement, and then adequate documentation that all controls were implemented and specifications met.

Identity verification of components

GMPs require companies to verify the identity of all components used to manufacture dietary supplements. "Component" is defined as "any substance intended for use in the manufacture of a dietary supplement, including those that may not appear in the finished batch of the dietary supplement. For components that are not dietary ingredients, a manufacturer may rely on a certificate of analysis from the supplier if certain criteria are met.

Because dietary ingredients are the central defining ingredients of a dietary supplement, the Final Rule requires each manufacturer to perform its own testing or examination to verify the identity of each dietary ingredient prior to use in the manufacturing process. The identity testing requirement applies to manufacturers who purchase dietary ingredients from a dietary ingredient supplier as well as to those who manufacture their own dietary ingredients.

Quality control

In the Final Rule, FDA clarifies that the GMPs do not require the creation of an independent quality control unit. Requirements are imposed upon "quality control personnel," defined as "any person, persons, or group, within or outside of your organization, who you designate to be responsible for your quality control operations. Quality control personnel essentially have ultimate oversight authority over GMP compliance.

Product complaints

The Final Rule requires that a "qualified person" must review all product complaints to determine whether the product complaint involves a possible failure of a dietary supplement to meet any of its specifications or other GMP requirements, and if so, to investigate that complaint Quality control personnel must review and approve decisions about whether to investigate a product complaint and review and approve the findings and follow-up action of any investigation performed. These reviews and investigations must extend to all relevant batches and records.

Product complaints that represent adverse events, covered by the Dietary Supplement and Non-Prescription Drug Consumer Protection Act (effective December 22, 2007), need to be analyzed, recorded, preserved, and made available for inspection in accordance with the provisions of that Act. Definition of an Adverse Event:

• Death
• Life-Threatening
• Hospitalization (initial or prolonged)
• Disability
• Congenital Anomaly
• Requires Intervention to Prevent Permanent Impairment or Damage

Manufacturers will have 15 days in which to report an adverse reaction or event to the FDA. The manufacturer will use Form FDA 3500A – Mandatory Reporting for filing of this event.

Recordkeeping and records access

The Final Rule requires companies to keep written records required by the Rule for one year past the shelf life date (if used), or two years beyond the date of distribution of the last batch of dietary supplements associated with those records. FDA clarifies that shelf life dating includes "best if used by" dating as well as expiration dating. Records may be kept as original records, true copies, or as electronic records if compliant with 21 C.F.R. Part 11. All records required by the Final Rule must be "readily available" during the retention period for inspection and copying by FDA "when requested."

For more information:

Reference: Current good manufacturing practice in manufacturing, packaging, labeling, or holding operations for dietary supplements; final rule Federal Register Monday, June 25, 2007, Pages 34752-34958.

Website: http://www.fda.gov/cder/dmpq/

Example Chain of Custody Form

A. Grower Contact: Date: _____

Salutation: _____ Name: _____ Title: _____

Company: _____

Department: _____ Email: _____

Address line 1: _____

Address line 2: _____

City: _____ State /Prov: _____ Zip/Postal: _____

Country: _____ Phone: _____ Fax: _____

Preferred Contact Method: ☐ Phone ☐ Email ☐ Post ☐ Fax

B. Material Description:

Material Description (Root, Stem, Aerial…)	Date Collected	Genus	Species	Lot Number	Verified By

Additional comments: _____

_____

_____

_____

_____

Materials received by: _____ Date: _____ Time: _____

Materials received by: _____ Date: _____ Time: _____

Materials received by: _____ Date: _____ Time: _____

Materials received by: _____ Date: _____ Time: _____

Materials received by: _____ Date: _____ Time: _____

Materials received by: _____ Date: _____ Time: _____

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About the speaker

Sarah Schober has had education, training, and work experience in the rapidly developing field of Biotechnology. Her experience began as a student at Asheville Buncombe Technical Community College (ABTCC) in Asheville, North Carolina where, in 2006, she earned three degrees. An Associate of Arts, Associate of Science and Associate of Applied Science in Biotechnology. After graduation, Sarah accepted employment as Lab Manager of the Natural Products Core Laboratory (NPCL) at ABTCC. As Lab Manager of the NPCL, she works with small scale herbal growers to provide material identification, quantify active constituents and to offer assistance with current good manufacturing practices. Sarah recently accepted a position with the BioNetwork BioBusiness Center in Western North Carolina as a Technical Specialist. As part of a statewide initiative that connects community colleges across North Carolina, she is part of helping to realize the goal of providing specialized training, curricula and equipment, to develop a world-class workforce for the biotechnology, pharmaceutical and life sciences industries. Sarah has sought additional training and certification at every available opportunity, including specialized training in High Pressure Liquid Chromatography (HPLC) and as an Instructor of Bioprocessing in the Workplace.

While playing an active part in a developing scientific community, Sarah also enjoys a very balanced life and benefits from the love and support of her husband and four children.

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WILD FOREST PRODUCTS: THE CASE FOR PARTICIPATORY AND PROACTIVE MANAGEMENT

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Introduction

Non-timber forest products (NTFPs), such as berries, medicinal plants, floral greens, and mushrooms, provide income, food, medicines, and craft material for many people around the world. The United States is no exception -- NTFP harvesting is an important part of rural economies and cultural traditions across the country (Jones et al. 2002). Beginning in the 1980s, global trade in NTFPs expanded rapidly. As demand for these products increased, NTFP harvesting, along with the people who harvested them, became more visible to forest managers in the United States. Along with visibility came a flood of regulations.

Media accounts often have painted harvesters as violent, greedy people destroying forest plants and fungi with no regard for forest sustainability in their rush to get rich quick. Many land managers have accepted these accounts unquestioning, and have used them as grounds for sharply curtailing access to NTFPs or prohibiting their harvest altogether. Meanwhile, the same land managers have ignored the impacts of other, often much more destructive land management activities – clearcutting, strip mining, herbicide application, and grazing – on NTFP species and harvester and dealer livelihoods.

Few land managers are knowledgeable about either the ecology of NTFPs or the economic realities of the industries based upon these products. Yet they rarely ask for input from harvesters or dealers when developing new regulations. As a result, the people who have the most to lose from such decisions have no voice in shaping them -- a clear case of political injustice. Excluding harvesters and dealers from decision making can also have negative ecological consequences, since they are often the only stakeholders with a detailed ecological knowledge of many of the NTFP species targeted for regulation. Leaving harvesters and dealers out of policy discussions often results in regulations that undermine long-term forest sustainability.

The following overview of the history of wild mushroom regulation in the Pacific Northwest illustrates why it is important for ginseng collectors and dealers to be involved in crafting NTFP regulations. It further highlights the importance for collectors and dealers to familiarize

themselves with how regulations are made and to develop strategies for learning about upcoming regulatory changes and ways to influence the content of new policies, regulations, and laws.

Emergence of the Pacific Northwest's Wild Mushroom Industry

For all practical purposes, wild mushroom regulations were non-existent in the Pacific Northwest prior to the 1980s. Anyone with a bucket and a knife was free to pick mushrooms on state and federally owned forests, as well as on most privately owned industrial timber land. In 1995, a mere 15 years later, the same mushroom picker was faced with a web of state, federal, and private regulations, including permit requirements for harvesting, buying, and transporting wild mushrooms, mushroom purchase record keeping requirements, area closures, mushroom seasons, and mushroom size limits. What prompted this flood of regulations and how did the regulatory landscape for wild mushrooms change so quickly? The answer to this question lies in the confluence of events that created just the right mixture of labor, resource supply, and market demand for the emergence of a highly visible wild mushroom industry in the Pacific Northwest during the late 1980s and early 1990s.

Labor - A severe recession and massive layoffs in the timber industry during the early 1980s left thousands of loggers and millworkers looking for a way to make a living. At the same time, political turmoil and genocide in Cambodia, Vietnam, and Laos brought hundreds of thousands of Southeast Asian refugees to California, Oregon, and Washington. Many of these refugees lacked the skills needed to obtain jobs in the region's already depressed economy. To eke out a living, large numbers of timber workers and refugees turned to the woods, where they could earn income by gathering and selling a variety of forest understory products.

Supply - The emergence of a large surplus labor supply coincided with a period of prolonged drought in eastern Washington and Oregon, which in turn led to a marked increase in the incidence and intensity of forest fire across much of the Northwest. The increase in forest fires resulted in a series of years during the mid and late 1980s with abundant crops of morels, a species that produces prolifically in burned over areas.

Demand - At the same time, the Chernobyl nuclear power plant disaster in Ukraine in 1986 contaminated forest soils over much of Eastern Europe, previously the major source of wild mushrooms for western Europeans. European brokers turned to the Pacific Northwest and southwestern British Columbia, both areas with large and reliable crops of morels, chanterelles, and boletes – all in high demand on European markets -- to fill the void in supply. On the other side of the globe, a failure in Korea's matsutake crop during the late 1980s also prompted Japanese brokers to search out new sources of supply in Canada and the Pacific Northwest.

The intersection of labor, supply, and demand moved the Pacific Northwest wild mushroom industry to center stage on the global mushroom market. The increase in profitability and visibility brought with it pressures to regulate the industry. Court battles that came to a head in

the late 1980s and early 1990s over old growth forests brought further pressure to protect forest understory species, including wild fungi.

Constructing a Wild Mushroom Regulatory Framework

State regulations - By 1995, state and federal regulations governed wild mushroom harvesting throughout Oregon and Washington. At the state level, Oregon and Washington added clauses to their special forest products laws during the early 1990s to include wild mushrooms. Both laws require harvesters to obtain and carry with them permits to harvest wild mushrooms. In Oregon, the harvest permit does double duty as a permit for transporting wild mushrooms on public roads and highways. Washington requires harvesters to obtain a separate transportation permit from the county sheriff or an authorized deputy. Both states require wild mushroom dealers to obtain dealer licenses, and to keep records of all purchases of wild mushrooms.

National forest regulations

Permits - The region's 20 national forests required harvesters to obtain permits for commercial and personal use by the mid-1990s. The price of commercial permits varied from $2 a day for chanterelles and morels in many forests, to $50 a day for matsutake in the national forests in central Oregon. Season or annual permits could also be purchased for prices as high as $200 for the 6-week matsutake season in central Oregon to as little as $100 for a 6-month permit (for all species other than matsutake) in most of western Oregon's national forests. Although individually none of the permits were excessively priced given the markets at the time, cumulatively the cost could be substantial given that many pickers move with the crops and thus might easily pick on 15 different national forests during the course of the year. Many of the national forests required buyers to purchase a permit (varying in price from $100 to $500 per season) to buy wild mushrooms within the national forest boundaries. In remote national forests where pickers tended to set up camp for several weeks at a time, industrial mushroom buying and camp sites were established. Some camps charged a fee (usually $3 to $5 per day); others were free. Resistance to permit requirements was initially very strong, but over time many pickers found it less stressful to buy the permits than to risk having to pay a fine.

Area closures - Far more devastating financially to pickers than the permit fees were the area closures that the national forests put into effect during the mid-1990s. The impact of area closures was most severe in the portions of Washington and Oregon covered by the Northwest Forest Plan. The Plan was developed by the U.S. Forest Service and the Bureau of Land Management to fulfill a court order to develop a management strategy to keep the northern spotted owl from going extinct. Under the plan, millions of acres were set aside as late successional reserves where commercial timber harvesting was prohibited. The agencies were not required to prohibit mushroom harvesting on these reserves. However, the Deschutes and Winema National Forests, which together have the region's most productive and reliable matsutake patches, closed down all their late successional reserves to commercial mushroom harvesting. Since matsutake in that area grows in association with Shasta red fir, which tends to be located in the late successional reserves, the closure had a significant negative impact on wild mushroom pickers and buyers. The decision to close these areas was made without taking into

account the economic impact on wild mushroom harvesters. It was also made in the absence of any scientific evidence that wild mushroom picking negatively affected forest ecosystems.

Mushroom seasons – Another regulation with serious negative impacts on pickers and buyers was the establishment of a picking season for matsutake. The opening and closing dates had more to do with administrative convenience and incorrect application of scientific findings to policy than they did with matsutake ecology. Four national forests in the central Oregon Cascades (Deschutes, Winema, Willamette, and Umpquah) established open and closing dates for matsutake harvesting. Several years previously, the forests had set up a mushroom permit system valid for the four forests rather than requiring pickers to get 4 separate permits. Although the decision was helpful in that it saved pickers both time and money, it had unanticipated consequences due to the lack of understanding of matsutake ecology and distribution patterns on the part of the Forest Service staff. Examples of some of these consequences are described below.

The four forests set the day after Labor Day as the opening date and the end of October as the closing date for the matsutake season. Labor Day was selected as the opening day to prevent mushroom pickers from overlapping with summer tourists. October 31st was selected as the ending date because several years earlier an unexpected snowstorm in early November made it difficult for pickers to clean up their camps before heading south. This left a large amount of litter for the Forest Service to clean up the following spring. The agency decided to select an ending date early enough to minimize the chances of a heavy snow occurring before the pickers moved on. Additionally, the Forest Service used ecological and economic arguments to further rationalize these dates, noting that an experimental plot located on the Winema National Forest showed that the matsutake that fruited prior to Labor Day tended to be wormy (and thus worth less on the market) and that the season was generally winding down by the end of October.

However, as many pickers have observed, these arguments are based on the incorrect extrapolation of findings from one of the area's lowest elevation mushroom patches to all matsutake patches – most of which are at higher elevations. Additionally, these arguments incorrectly assume that matsutake fruits at the same time on the east side of the Cascades (Deschutes and Winema) as it does on the west side of the Cascades (Umpquah and Willamette). In fact, the season on the east side of the Cascades begins as early as mid-August and can end as late as mid-November. On the west side, the matsutake season rarely gets going strongly until late October to early November. A picking season that ends at the end of October thus effectively shuts out pickers and buyers working the west side patches.

Responding to Regulation

In the late 1990s, pickers and buyers sought unsuccessfully to have the late succesional reserves reopened to commercial picking and to get the season ending date removed. In 2000 a group of mostly Southeast Asian and a few Euroamerican mushroom harvesters allied themselves with several non-profits and community groups (Jefferson Center, Institute for Culture and Ecology, Sierra Institute, Crescent Lake Community Action Team, Alliance for Forest Workers and Harvesters, Illinois Valley Forestry Action Committee,) to carry out a project known as the Crescent Lake mushroom monitoring project. The Crescent Lake mushroom monitoring project

sought to expand harvester input into wild mushroom management on national forests in Oregon. A major breakthrough occurred in 2003 when a coalition of harvesters and non-governmental organizations stopped plans to do some heavy thinning in some of central Oregon's most productive matsutake areas. While most harvesters are not opposed to thinning per se, the thinnings that the Forest Service proposed involved removing a large number of trees, many of them Shasta red fir, and using machinery that tore up the ground. In short, the thinning would destroy the matsutake beds, which can take up to 80 years to recover. When the coalition pointed out that the environmental assessments for the thinning operations had not included an analysis of their impact on matsutake patches or on the matsutake industry, clear violations of both the Executive Order 12898 on environmental justice and the National Environmental Policy Act, the Forest Service eliminated one of the planned thinning units, and modified harvesting operations in other areas. The coalition also was successful in getting the season ending date removed, but has yet to get the late successional reserves opened up to harvesting.

Lessons Learned

Several important lessons can be drawn from the Pacific Northwest wild mushroom regulation example. First, the case illustrates that failure to include harvesters and dealers in nontimber forest product decision-making runs the risk of creating ecologically and economically unsound regulations since many land managers lack an adequate understanding of both the ecology and economics of the industries being regulated. Second, the case demonstrates the power of alliances and networks that work together to change existing bad regulations, to help shape regulations that make sense, and prevent bad regulations from being made in the first place.

The ginseng industry faces many of the same issues that wild mushroom pickers have dealt with over the past 20 years. In August 2005, for example, the U.S. Fish and Wildlife Service issued a very restrictive export policy on ginseng. The agency did not consult ginseng growers, collectors, and dealers when it developed the new regulations. In a public letter criticizing the new policy, a ginseng ecologist noted that the new rules were likely to harm, rather than protect, ginseng populations. A number of groups and individuals submitted public comment letters pointing out the weaknesses of the decision; others put pressure on their congressional representatives to get the decision rescinded. In the face of this organized opposition, the U.S. Fish and Wildlife Service took the unprecedented step of convening a series of public meetings to come up with a viable alternative to the rule. A few months later, the agency rescinded its original decision. This example supports another lesson learned in the wild mushroom industry – getting a voice in policy making requires concerted action within the industry as well as the involvement of scientific and political allies.

References

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About the speaker

Rebecca is a policy analyst with the Institute for Culture and Ecology, and has a Ph.D. in forest policy from the University of Washington. During the past 15 years, she has studied policies affecting harvesters and buyers in the wild mushroom, floral greens, and pine nut industries. She is currently working on several projects aimed at getting policy makers and land managers to include harvesters and buyers when making land use decisions that affect non-timber forest products access and commerce.

OVERVIEW OF SATE AND FEDERAL GINSENG REGULATIONS AFFECTING GROWERS

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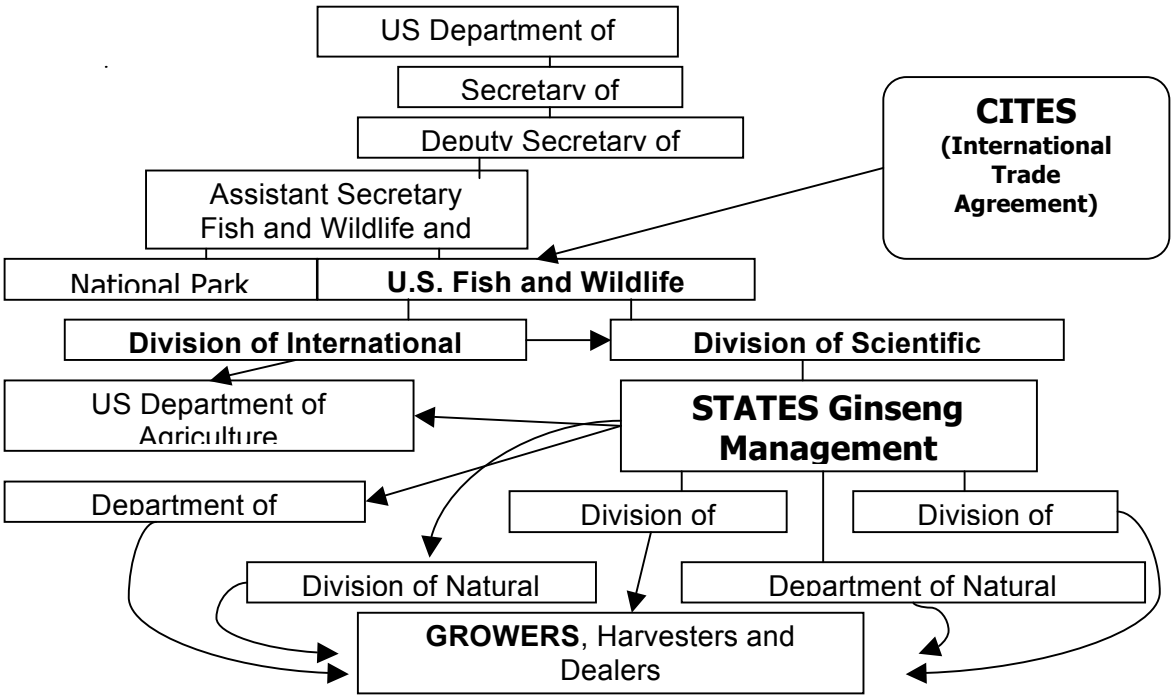
There are many different and varying laws, rules and regulations in place today that impact wild-simulated ginseng growers abilities to best harvest and market their crops. In this presentation we will be discussing those which most directly impact growers abilities to do as they please with their intentionally grown ginseng. Some examples of regulation that currently impact growers include; harvest, buying and selling seasons, interstate export laws (growers selling over state lines), federal export requirements (under CITES, limit markets for growers) and lack of scale (weighing) requirements in some states may leave growers receiving the "short end of the stick".

Current "Structure" of Ginseng Management in United States



Currently, wild American ginseng is listed on and regulated under the CITES agreement (Convention on International Trade in Endangered Species of Wild Flora and Fauna). CITES is an International agreement between governments to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Currently 172 government parties work under CITES, species such as Ginseng, Goldenseal, Elephants, Great Apes, Mahogany & Sturgeon all fall under CITES. Within CITES there are 3 appendices, these are simply lists of species afforded different levels or types of protection from over-exploitation. Appendix I lists species that are the most endangered among CITES-listed animals and plants, Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled and Appendix III is a list of species that needs the cooperation of other countries to prevent unsustainable or illegal exploitation. Ginseng is currently listed as Appendix II, the United States Fish and Wildlife Service (USFWS) is the designated CITES Authority in the US.

This can all get pretty confusing for someone who simply would like to grow this crop in their forest and then sell it into the commodities market like any other agricultural crop. Essentially, the USFWS must issue "Scientific Findings" regularly in order to comply with CITES. These "findings" are developed annually after all states have submitted their ginseng export numbers for the year. The goal of the findings is to determine if trade and harvest of American ginseng is sustainable in any given state.

Currently only some "woods grown" (ginseng grown in the forest environment in intentionally tilled and amended beds) and "cultivated" (ginseng grown under artificial shade cloth in open fields) meet the CITES definition for "Artificially Propagated" (see definitions below). Wild-simulated ginseng (ginseng that is planted in the forest without any tilling or major soil disturbance) is currently regulated as wild ginseng in most all instances.

CITES definition of "artificially propagated"

'Under controlled conditions' means in a non-natural environment that is intensively manipulated by human intervention for the purpose of plant production. 'Cultivated parental stock' means the ensemble of plants grown under controlled conditions that are used for reproduction, and which must have been, to the satisfaction of the designated CITES authorities of the exporting country

Although wild-simulated ginseng growers may be growing in areas that they have "intensively manipulated" by cutting down trees to increase light and air flow, weeding undesirable species, adding gypsum or other amendments to their plantings, growing in a forest that is also being managed for maple syrup or timber production their product is still regulated as if it were truly wild. Wild-simulated growers may often use seed from "cultivated parental stock" which should qualify them for "artificially propagated" status, but does not. Wild-simulated growers suffer the most regulation as wild-simulated ginseng is often sold as wild ginseng even if the state distinguishes (fear of lower prices on part of grower & inability to distinguish from wild on part of State/Federal). Wild-simulated is therefore subject to all laws governing wild ginseng such as harvest season dates & restrictions and all State and Federal export laws. Interstate commerce

can be a Federal offense (including internet sales) under the LACEY Act, this and other laws pertaining to wild ginseng limit the growers ability to best harvest & market their crop.

Wild versus wild-simulated

Some states do encourage distinguishing wild-simulated from truly wild roots by including a column on certification form and/or digger sheets for wild, wild-simulated, woods-grown and cultivated, while some states do not. In West Virginia the forms include wild, wild-simulated, woods-grown and cultivated columns, the Ohio forms only asks if the root is "Green" ginseng or "Dried" ginseng. In 2007 ginseng buying season I did a limited survey and determined that over 40 percent of the root that I purchased as wild ginseng was in-fact wild-simulated. This 40 percent+ included only roots that I knew came from wild-simulated growers whom I had relationships with. This becomes an issue when States submit this data to USFWS who conclude that wild-harvest levels are up. In reality much of the so-called "wild" root is really wild-simulated. This can lead to poor management & policy decisions based on bad data and growers suffer over-regulation.

One example of poor policy impacts on growers can be found in the 2006 USFWS Ginseng Findings; "We support and recommend the planting of wild ginseng seeds from wild plants where they are harvested. However, based on scientific findings, we do not support the planting of "commercial" or non-local seed to augment and/or restore native wild populations" – USFWS 2006 Ginseng Findings

This can be problematic when for years growers have actively sought out sites on which ginseng naturally occurs when looking for the best sites on which to begin planting seed. This has gone on for hundreds of years and is still the standard for determining good growing sites. Problematic too for the harvester who may be digging ginseng from a poor, clear-cut or to be developed site, when he/she isn't allowed to take the seed to a more suitable habitat.

Another example of this occurs under West Virginias new ginseng grower certification where the law requires that West Virginia Division of Forestry perform a site-visit to the growers site in order to determine there is no Wild Ginseng present before allowing the grower to register the site with the State. I personally, and many others before me have given educational lectures in West Virginia telling growers and potential growers to seek out ginseng on their property in order to potentially find their best growing sites.

Although all of this likely has little or no impact on you while you are growing your ginseng these issues become important when it comes time to harvest & market your wild-simulated ginseng. Even though you bought the seed and planted it on your own land you still must harvest only in season, only harvest roots at least 5-years old, have the roots certified if you will sell or transport it out-of-state and only sell roots within the allowed season for commerce.

Many upstanding, morally minded ginseng growers are "pigeon holed" into breaking these laws in order to get the best value out of their crops. Many wild-simulated growers begin harvesting their crops in the late spring & early summer due to time constraints and the amount of time it takes to properly dig and process large amounts of root. In WV I've heard growers may be

known to remove or "top" any wild ginseng from their property before having WVDOF out to certify the site. Some states enforcement may be lenient towards the laws, but none of us want to be breaking any nonetheless.

The ginseng industry today is changing rapidly, the growers and harvesters who have stewarded ginseng along for the last 100+ years, long after many thought the plant was all but extinct will today either benefit greatly from or lose the ability to successfully cultivate ginseng into the future. The current situation today is that only 1 state (West Virginia) currently has any form of grower certification specific for wild-simulated growers. Kentucky is currently working on something although when I had a chance to review the legislation I had concern to see in Section 4. KRS 246.660 "shall administer a program which provides a framework, including a limited harvesting season for wild American ginseng and WILD SIMULATED GINSENG". This legislation would specifically restrict a wild-simulated ginseng growers ability to harvest their crop. If a ban or moratorium on wild-harvest/export were put into place today, West Virginia would be the only state whose wild-simulated growers could legally export/market their wild-simulated crops largely due to the efforts of the ginseng growers organization in that state.

Why don't all states use the same process, forms data, rules and regulations? Currently states are responsible for their own ginseng program based on guidelines from USFWS. States programs are overseen by different agencies (in WV-Division of Forestry, OH-Division of Wildlife, KY-Dept. of Agriculture, etc.) and for most all states this is a unfunded mandate and programs do not cover their own costs. Many states ginseng program coordinators are only able to dedicate a small percentage of their time to the ginseng programs as they also have other responsibilities within the given agency.

Ginseng has long standing cultural and financial value and significance. In 1915 Ohio lawmakers made it a felony to enter a garden or enclosure, owned by another, which is devoted to the culture of ginseng or goldenseal (breaks down, digs, destroys, takes or carries away and ginseng, goldenseal or seeds) punishable by a fine of not less than $50 nor more than $500 or imprisonment for not less than 1-year nor more than 3-years. What happened? This was very important in 1915 and it was taken seriously by the courts and recognized as a substantial and legitimate industry. American ginseng has already experienced a couple of cycles of "boom" economy in its history, once after first being "discovered" in the 1700's and again in the late the nineteenth and early twentieth centuries ginseng was grown and harvested in earnest to satisfy overseas markets. The latter "boom" was encouraged by a slew of publications from many state and federal agencies promoting and instructing the best cultivation practices of the day. Most all of these practices are still commonly practiced today, however we have now in recent history given them different names such as "wild-simulated", "cultivated" and "woods-grown", all describing a very distinct process and product. As economies changed, many "booms" were followed quickly by "busts" and often it was the poor rural communities throughout ginsengs native range who suffered the most from these cycles. "No meeting for the Ohio Ginseng Growers was scheduled for the summer of 1916, and it appears it is on the road to oblivion, along with several others. The Wisconsin and Michigan associations, however, are much alive, and their summer meetings were well attended. At these sessions, there was considerable talk of forming some sort of National Association." -- *Woodland Nuggets of Gold* Val Hardacre

Could history be repeating itself? It would seem that in recent years there has been somewhat of a resurgence of interest in ginseng, with literally Tons of seed being sold annually for both large and small scale growing operations. Today we need to be able to come up with solutions to many of the issues that are currently facing ginseng as a species as well as those who try to grow and care for it. Because of ginsengs rich history and the cultural traits that have evolved along with the ginseng industry, growers have long been a secretive bunch, not sharing often even with their own families where their patch is or the fact that they are growing it! I suppose when you are producing a crop of such value that people have been well known to seek, steal or "poach" it from you, you have to be secretive or you risk losing your crop, years of hard work and potential income. Ginseng growers today are in a position to steward this plant forward as development, deer, and mountain top removal all threaten to severely impact ginseng and its habitat throughout its native range. Some possible solutions for today include; organizing a National Organization of Ginseng Growers… Power of Numbers, "Grower Certification" programs that certify wild-simulated growers crops as "intentionally produced", Marketing Cards / Licensing for growers (I.e. Tobacco), Permitting/licensing for diggers to help generate income for States programs, fees for buyers, limiting the number of buyers (oversight), and getting everyone on the same page, same forms, same standards & definitions.

In the meantime I encourage growers to not operate in the dark, recruit, enlist and share with others what you are doing, keep good records of your plantings, seed purchases and other expenses related to you growing and become active and involved with other growers groups.

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About the speaker

Chip and his wife Amy live on a small farm in Southeast Ohio where they raise ginseng, sheep, cows & donkeys. Chip's business, WoodlandWise Botanicals is currently licensed to buy ginseng in Ohio, West Virginia and Kentucky. Chip regularly does on-site consulting for landowners interested in growing ginseng and other medicinals. In the summer of 2007 he began overseeing the Internship Program for United Plant Savers on their 400-acre Botanical Sanctuary in Rutland, Ohio. From 1999 - 2007 Chip held a number of positions with Rural Action's Forestry Program and was the Assistant Farm Manger for Frontier Natural Products'; National Center of the Preservation of Medicinal Herbs in 2000-2001. Chip holds an Associate Degree in Fish & Wildlife Management from Hocking College. Chip is currently an active board member of the Roots of Appalachia Growers Association.

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WEST VIRGINIA GINSENG CERTIFICATION PROGRAM: FIVE YEARS OF BUREAUCRACY

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Recognition of a problem

Appalachian people have been growing and tending ginseng patches for several hundred years. The WVGGA has been developing a grower organization for ten years. In 2003, WVGGA recognized that government regulations regarding wild ginseng were infringing upon our rights as agricultural producers.

In the 1970s, USFWS began regulating the export of ginseng as a wild plant. The root cause of our problem has to do with a loss of US sovereignty when congress signed the CITES treaty in the 1970s. The ginseng industry will eventually succumb to pressure from other countries which will impact US export and commerce involving ginseng. As rural people, ginseng growers are outnumbered and at a political disadvantage.

Prior to the WV certification and permit process, wild-simulated and woods-grown ginseng that individuals planted and propagated as a commercial crop fell under the same monitoring and regulating as ginseng growing naturally in the wild. The action of the WV legislature, prompted by the WVGGA and with the collaboration of the WV Division of Forestry, was in response to the awareness that the trade of ginseng farm crops could be restricted by USFWS through CITES if a system to separate "wild" from "intentionally grown" ginseng were not established. "Wild" is the term used to describe ginseng growing naturally with unknown origins.

Addressing the problem

As a group, we recognized that we have the power to pursue change. Initially, WVGGA was developed to train people to grow ginseng but grew to be an advocacy group to address issues impacting intentionally grown ginseng. The WVGGA strategy:

- Start with state agencies to get ginseng recognized as a crop.
- Educate lawmakers regarding issues impacting growers.
- Pursue legislation.

First attempts

The WV House delegated a staff attorney to draft legislation for a ginseng program. This proved cumbersome as every party involved had a different, often erroneous, perspective about what we wanted to do. Attempts were made to align the program with standards of the USFWS. This

legislation failed. With no resolution, the next year WVGGA bombarded the legislature with letters and calls---over 500 in a two day period. We were now on their radar.

The final law

The old ginseng legislation was opened and new legislation was passed by both the state House and Senate. The WV Division of Forestry was now mandated to implement the certification program. The next step was for the WVDOF to develop rules to abide by the new legislation. Once the legislation was passed, it took the state several more years before the program became active.

What the new law means

The West Virginia Ginseng Law was developed to protect ginseng and the ginseng industry. The WV ginseng permit and certification process are not mandatory. Ginseng can be planted without a permit. An expensive, professional boundary survey is not required. A permit is required to grow ginseng commercially outside the scope of laws regulating "wild" ginseng.

The ginseng certification process was established for the protection of intentionally-grown ginseng so that growers have an avenue to certify that their ginseng is intentionally-grown rather than wild and, therefore, falls outside the regulations for "wild" ginseng under the purview of US Fish and Wildlife Service (USFWS) and the Convention on International Trade of Endangered Species (CITES). This is necessary because the Fish and Wildlife service had not recognized that naturally growing ginseng was planted by growers and that American Ginseng is an agricultural crop.

The process

This legislation provides for ginseng grower's permits and related fees to administer the program. The WV Division of Forestry issues grower's permits to landowners who want to grow ginseng for commercial purposes. Ginseng certifications are exempt from Freedom of Information policy.

The fee for a permit is ten dollars. The first grower's permits will be issued in January 2008. Determinations have already been conducted with many growers and growers report this to be a "painless" process.

Determinations

Prior to issuing a grower's permit, the WVDOF conducts a determination to verify the presence or absence of "wild" ginseng on the planting site. If "wild" ginseng is found on the potential planting site, it is excluded but this does not restrict the entire site from planting.

Ginseng "plats"

After the WVDOF determination, a ginseng "plat" is produced. The ginseng plat is a map of the planting site. A ginseng plat is not a boundary survey but can coincide with boundaries. While a boundary survey can be accepted as a ginseng plat, a professional boundary survey is just one option and is not required. WV Division of Forestry prepares ginseng plats at no cost to landowners through Landowner Assistance Foresters using GPS units. Funding for the ginseng program comes from the WV Division of Forestry's operating budget.

A "grandfather clause"

Ginseng growers who were already planting ginseng at the time of the legislation are being grand-fathered into the program and the determination is not necessary. Prior to being grand-fathered in, the grower will need to identify where the seed was purchased. Taking seed from naturally growing plants is not a considered a commercial source.

Some thoughts on why WVGGA was able to get this done

• We are an association of landowners with common interest in woodland medicinal plants.
• We operate on social capital and voluntary work of members
• We are inclusive of community and reaches out to others who want assistance
• We are invested in the culture, heritage, and economy of our region
• We are more concerned with outcomes than with image
• We are self-directed and action oriented
• Our knowledge base and resources are owned by people who care

Lessons learned

• Don't try to appeal to the emotions of government officials and lawmakers – Letters, phone calls, and pressure are key. Right and wrong are not part of the vocabulary.
• Have your agenda down to specifics and be prepared to educate a lot of people.
• Be prepared to work on task for years, not months.
• Once the power of the group is understood by lawmakers, having one key coordinator for the group is critical.
• Don't think that the passage of legislation is the end solution. It is just the first step.
• Never underestimate the power of the bureaucracy to procrastinate or to complicate.
• Keep the communication and pressure flowing.
• Within state agencies, a little knowledge can be a dangerous thing. To avoid misinterpretation, education and input each step of the way are key.

Is the glass half full or half empty?

The law of supply and demand dictates that higher prices will produce more ginseng in all categories and will provide incentive for more people to plant seed for future crops. Free Enterprise Is Good.

A California Film Crew recently filmed a show about ginseng harvest in WV which has drawn criticism from the same industry group. Their biggest criticism was that the show should have

demonstrated only cut rate prices for ginseng. The criticism was a result of the fact that a handful of roots fetched over $200.00 with one root getting $150.00 singly. The retail value of high grade wild roots was shown to be around $4800.00 per dry pound at this time.
Industry lobbyists can not demonstrate that more plants are being harvested as a result of this exposure but I can demonstrate that more people are planting ginseng now as a result of the exposure.

Future outreach

As the film company has become more educated about ginseng and the plight of our culture and industry, they have expressed further interest in coming back and doing additional shows, perhaps even helping to create direct markets for growers and diggers with Asian buyers.

The WVGGA continues to grow and expand our circle of influence. The WVGGA has become a point of contact for outreach concerning ginseng and advocacy for growers and landowners in general.

Expansion to include other growers in the Appalachian region to develop political influence, protect the emerging industry and control prices of products for the benefit of the grower.
A National Organization of Woodland Growers is Needed Now!

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About the speaker

Fred has a Master's degree from Marshall University and is a Certified Holistic Educator. He is the Director of the Center for Sustainable Resources, District Supervisor for Capitol Conservation District, and founder of the West Virginia Ginseng Growers Association. Fred and his wife raise game-fish, livestock, trees, and woodland herbs on 150 rugged acres in West Virginia.

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FACILITATED DISCUSSIONS:

A national ginseng growers association

Currently, there is no collective place for universities, extension, and growers to come together and discuss the NTFP industry. Forming a national growers' organization might help to establish ginseng as a forest crop in eastern North America, and perhaps help quantify the numbers of growers and income derived. An association could also help get ginseng, or at least forest grown ginseng, off of CITES. It would also help in getting the attention of lawmakers, which was successful for the honey industry when that collapsed.

The national organization would aim to use power through numbers to set up rules and regulations surrounding ginseng growing. It could act as a 3rd party to oversee the industry and serve the interest of the growers. Also, representatives from different regions in the organization could meet with state officials to develop rules and regulations that work for the stakeholders. State legislation may have to be handled separately than federal regulation.

As an initial member base, any current member of state ginseng organizations could become automatic members of the national organization. That would create about 1,000 members to form a nucleus. Growers of woodland plants in general, not just ginseng, are hungry for organization. The challenge is going to be coordinating a vast area with limited funding. An institution such as Rural Action or another NGO might be helpful in getting this started.

Should the national system be built from states or should states advise a national agenda? This is a local issue, so the work should be kept deeply local to get work done on the ground. The first step is to identify states with constituencies and then by moving national, more individual groups will be drawn out. Perhaps organize state by state to gather key players from the bottom-up. Representation could be at the national level with each state having its own identity. State organizations will address their own state legislation. However, do not let waiting for state organizations to form to be a barrier in getting a national organization started.

Possible Association Names

The following names were suggested by attendees to represent a national ginseng growers association. The fist suggestion was voted on by the majority for the preferred association name.

~ National Woodland Ginseng Growers and Stewards
~ Ginseng Stewards of America (GSA)
~ National Ginseng Growers Association
~ National Association of Woodland Ginseng Growers and Stewards
~ Woodland Appalachian Ginseng Group
~ Woodland Ginseng Growers and Stewards: A National Association of Growers and Stewards
~ American Woodland Growers Group
~ SANG – Stewards of American Native Ginseng
~ American Woodland Ginseng Culturists
~ Ginseng Woodland Stewards, Growers, Diggers

Grower and industry needs

Lack of funding is the greatest barrier in developing more ginseng research projects. Growers need to make their voices heard in order to direct funding towards ginseng research. Even now, there is less funding for ginseng research at Cornell University than there was 25 years ago. However, dairy research continues to be well-funded. At Cornell, the main and only NTFP extension faculty member is retiring next year, and there is a concern that the program will not continue.

The time lag from planting to harvest (10+ years) is another challenge for interest in ginseng research. During this time, the plant needs to be tended. This long-term, intensive commitment is not justified by the recent spike in prices; a more reasonable price for the time and effort would be $2,000 per pound.

In responses to research grant proposals, Jeanine Davis found that many funders feel that there has been a good amount of work done in the ginseng industry. Outside letters of interest have helped obtain research funding in the past. Because many ginseng researchers do not have an operating budget, research grants are essential to getting the work done. There are innovative ways to obtain funding for NTFPs. For example, mayapple is a hot topic right now, and Jeanine's office is going through the medicinal arena to agriculture research. The voices of growers, diggers, and dealers can make a difference in obtaining research funding.

The Southern Research Station of the Forest Service is made up of 200 scientists, of which only one specializes in NTFPs. Decreasing operating budgets and the current war in Iraq are the biggest challenges to obtaining funding for NTFP research in the federal government. Also, as long as fires are active, research receives very little. When asked what it would take for NTFP management on national forest lands, the Forest Service Chief and district rangers responded: 1. The economic value of plants needs to be understood and justified, 2. The ecological impact of NTFP management needs to be understood and harvesting should not affect ecological integrity, 3. Constituencies interested in NTFPs need to be strong. Currently, the Forest Service has four main research topis: 1. Fire, 2. Invasive species, 3. Off road recreation, 4. Water resources.

Funding does exist for wild ginseng, especially because it's a CITES concern. In the Smoky Mountain National Park, a researcher spent over 1,000 hours studying plots of ginseng before it was poached. Those 1,000 hours could have been spent planting more ginseng or helping to educate the public.

We could turn the argument around and use ginseng as a means to save forests from timber harvesting. Eric Burkhart, a NTFP researcher, considers ginseng to be the 'gateway drug' for conservation. Interest in ginseng generates interest in other potentially commercial forest understory plants.

More research needs to be done on what happens to ginseng sold at high prices. Some ginseng from last year is being sold retail for $4,800 per pound. This was witnessed by an attendee on a television program and the internet from San Francisco where a Chinese dealer was selling wild

ginseng for $299 per ounce. Someone is making money on high ginseng prices and may be a reflection of the growing Chinese economy in light of the struggling US economy. Should growers and diggers be entitled to more per pound for their efforts at these high prices? It is questionable whether ginseng is really being bought at these prices, or if it is simply sitting on the shelves. A few pounds may be sold at these high prices, but is likely not the norm.

Technical assistance needed with :

- How to deal with restrictions applied to growers at the state and federal levels
- Finding native seed stock sources and potential
- Assistance with developing seed nursery operations
- Reducing the failure rates of woodland growers

Research questions raised:

- Are the younger generations in China as interested in traditional medicine as the older generations?
- Will cheap cultivated ginseng become more desirable on the market rather than wild stock?
- What is the best way to increase profits to the grower/digger? For example here are options suggested by attendees:
  - ~ Determine a minimum price for ginseng.
  - ~ Sell directly to Asia.
  - ~ Ginseng convention for the entire Appalachian region where buyers can purchase directly from diggers and growers.
  - ~ Grade ginseng quality here in the United States.
  - ~ Sell at an auction like tobacco and firs.
  - ~ Form a growers' organization.

Extension needs:

- More programs are needed to increase public awareness of ginseng. We need to think in terms of educating our own people and showing them the importance of ginseng. This might keep the price high and the demand local.
- Need to reduce the failure rates of woodland growers

Theft

Approximately 3 out of 5 ginseng growers in the audience have been poached. This is a large percentage of growers, and the punishment often does not reflect the crime.

There is more responsibility on the grower to protect their ginseng from poaching, not on the poacher or legislation maker. Younger poachers learn about the value of ginseng from older generations, but cultural exchange about conservation is lost and these young poachers are often out to make quick money. Education to the public of all ages is needed. However, it could be a double-edged sword, since many young people just don't know what ginseng is.

Poaching is a serious issue, and many attendees feel that it's only going to get worse. Poaching is "personal" because of the amount of time invested in growing your crop, not necessarily the $1,000 per pound. Prosecutions do not give justice to the grower in this respect. The small-time grower is likely going to be affected the worst. In order to deter poaching, we need to find a way to prosecute on the amount of work invested in addition to the economic value. Prosecution should be taken to great lengths to protect the grower. Perhaps the value of the product could be demonstrated through certification. This gives prosecution an idea of the intensive growing method and worth of the crop. It's possible to file a civil service suit if one does not feel justice was brought in prosecution.

One audience member recounted his story of being poached. Five pounds of 4 year old root were taken. The poachers wore camouflage and netting, so there was no doubt they knew they were committing a crime. A neighbor caught the poachers and called the landowner and deputy. They converged alongside the road and argued over the ownership of the ginseng. In the end, the deputy decided to split the ginseng between the landowners and poachers, and let the poachers free. The deputy was not aware of the strong laws in West Virginia, and the poachers may return because they weren't prosecuted. On a positive note, the dealer would not buy the ginseng from the poachers, because he knew where it had come from and that it had been poached.

A researcher suggested getting a large group of people together that could go to legislators and get their attention to influence regulation and poaching prosecution. Another option would be to insure your ginseng crop. The Farm Service Agency will insure ginseng for a fee to the grower, but will only cover disease, drought and similar impacts, not poaching. However, many people grow ginseng on land they do not own, and obtaining insurance and prosecuting poaching would be difficult to prove or justify. By law, if one does not have permission to grow ginseng on land they do not own, it is considered poaching to harvest the crop. There is a difference between poaching and stealing. Stealing should have stronger laws and more severe punishment.

Perhaps it should go back to the dealers. They should know where the ginseng is coming from and who is guilty of poaching. The dealers should be held accountable for buying stolen root.

A researcher provided survey data that suggests that 37 percent of ginseng planters in Pennsylvania have been poached. An attendee noted that this is not a low number despite Eric's suggestion otherwise, commenting "Imagine the public outrage if 37 percent of households were broken into."

WEB-SITES

- **American ginseng and goldenseal in Pennsylvania**
  PA Department of Conservation of Natural resources
  http://www.dcnr.state.pa.us/forestry/wildplant/vulnerable_plants.aspx

- **American ginseng and goldenseal in New York**
  NY Department of Environmental Conservation
  http://www.dec.ny.gov/animals/7130.html

- **American ginseng in Maryland**
  MD Department of Agriculture
  http://www.mda.state.md.us/plants-pests/plant_protection_weed_mgmt/ginseng_mgmt_program/index.php

- **American ginseng in West Virginia**
  WV Division of Forestry
  http://www.wvforestry.com/ginseng.cfm?menucall=ginseng

- **American ginseng in Ohio**
  OH Department of Natural Resources
  http://www.dnr.state.oh.us/tabid/5845/default.aspx

- **American ginseng in Virginia**
  Virginia Department of Agricultural and Consumer Services
  http://www.vdacs.virginia.gov/plant&pest/ginseng.shtml

- **Herbs and specialty crops in North Carolina**
  North Carolina State University
  http://www.ces.ncsu.edu/fletcher/programs/herbs/

- **Good manufacturing practices (GMPs)**
  United States Food and Drug Administration
  http://www.fda.gov/cder/dmpq/

- **Forest farming information**
  USDA National Agroforestry Center
  http://www.unl.edu/nac/forestfarming.htm

PUBLICATIONS

Many of the following publications below are available for free via the internet (links provided). Otherwise, ordering information or for each publication is provided..

• **Opportunities from Ginseng Husbandry in Pennsylvania. 2007.** Eric Burkhart and Michael Jacobson. Forest Finance Series #5, College of Agricultural Sciences. 16 pp.
Available on-line at: http://www.dcnr.state.pa.us/forestry/wildplant/ginsengpublications.aspx

• **American Ginseng.** 2004. Eric Burkhart and Michael Jacobson. Non-timber Forest Products (NTFPs) from Pennsylvania Series #1, College of Agricultural Sciences. 12 pp. [UH170]
Available on-line at: http://www.dcnr.state.pa.us/forestry/wildplant/ginsengpublications.aspx

• **Goldenseal.** 2006. Eric Burkhart and Michael Jacobson. Non-timber Forest Products (NTFPs) from Pennsylvania Series #2, College of Agricultural Sciences.
Available on-line at: http://www.dcnr.state.pa.us/forestry/wildplant/goldenseal_publications.aspx

For free printed versions of the above three publications, contact: Penn State Cooperative Extension, 313 Forestry Resources Building, University Park, PA 16802. Phone: 814-863-0401

• **Growing American Ginseng in Ohio: An Introduction.** 2004. Chip Carroll and Dave Apsley. The Ohio State University Extension. 4 pp. [F-56-04]
Available on-line at: http://ohioline.osu.edu/for-fact/0056.html

• **Growing American Ginseng in Ohio: Site Preparation and Planting Using the Wild-Simulated Approach.** 2004. Chip Carroll and Dave Apsley. The Ohio State University Extension. 4 pp. [F-57-04]
Available on-line at: http://ohioline.osu.edu/for-fact/0057.html

• **Growing American Ginseng in Ohio: Selecting A Site.** 2004. Dave Apsley and Chip Carroll. The Ohio State University Extension. 4 pp. [F-58-04]
Available on-line at: http://ohioline.osu.edu/for-fact/0058.html

• **Growing American Ginseng in Ohio: Maintenance, Disease Control, and Pest Management.** 2007. Chip Carroll and Dave Apsley. The Ohio State University Extension. 4 pp. [F-63-07]
Available on-line at: http://ohioline.osu.edu/for-fact/0063.html

• **Growing American Ginseng in Ohio: Harvesting, Washing, and Drying.** 2007. Chip Carroll and Dave Apsley. The Ohio State University Extension. 3 pp. [F-64-07]
Available on-line at: http://ohioline.osu.edu/for-fact/0064.html

• **The Practical Guide to Growing Ginseng.** 1998. Bob Beyfuss. 65 page booklet.
Available for purchase only. Orders may be mailed to Cornell Cooperative Extension, 906 Greene County Office Building, Cairo, NY 12413. Cost is $6

• **Producing and Marketing Wild Simulated Ginseng in Forest and Agroforestry Systems.** 2000. Andy Hankins. Alternative Agriculture Series, Virginia Cooperative Extension. 8 pp. [354-312]
Available on-line at: http://www.dcnr.state.pa.us/forestry/wildplant/ginsengpublications.aspx

• **Growing and Marketing Ginseng, Goldenseal & Other Woodland Medicinals, 2nd edition.** 2008. W. Scott Persons and Jeanine Davis. Bright Mountain Books. 466 p. + illustrations.
Available for purchase only. Contact: Bright Mountain Books, Inc., 206 Riva Ridge Drive, Fairview, NC 28730. Web-site: www.brightmountainbooks.com

ORGANIZATIONS

• Roots of Appalachia Growers Association (RAGA)

Web-site: www.rootsofappalachia.org
Contact information: P.O. Box 157, Trimble, OH 45782
Membership cost: see web-site

• West Virginia Ginseng Growers Association (WVGGA)

Contact information: Fred Hays, P.O. Box 241, Elkview, WV 25071
Membership cost: $10 per year

• National Association of Woodland Ginseng Growers and Stewards

This group is looking to form (see facilitated discussions in this document). Membership dues and benefits are being discussed. If interested in belonging to this association, then please contact Fred Hays with the West Virginia Ginseng Growers Association (contact information provided above).