Digging Deeper Into Ginseng Forest Farming:

Site Selection, Pest Management, Leaf Harvests

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Shaver's Creek ENVIRONMENTAL CENTER

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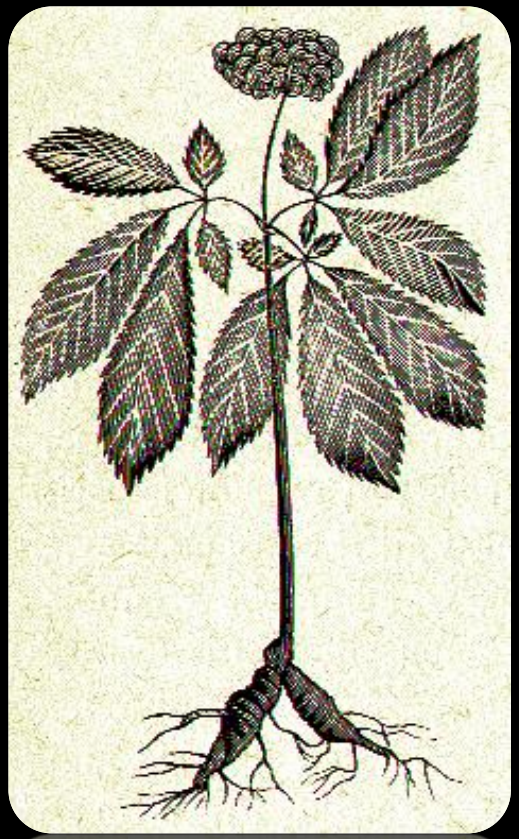
www.shaverscreek.org/about-us/meet-the-staff/ericburkhart/



ging and Stewardship 101

g steward requires care, patience, restraint, and active management of wild ginseng

'O LEAVE A REVIEW

WEBINARS

LANGUAGE:
English

RECORDED WEBINARS

Ginseng Foraging and Stewardship 101

RECORDED: September 1, 2021, 7:30 PM - 9:30 PM

American ginseng is one of the most "hunted" forest plants in Pennsylvania. During **Ginseng Foraging and Stewardship 101**, Eric Burkhart from Penn State University will draw upon current science to provide tips that you can use to help improve and steward your own patch or hunting grounds, including how to encourage plants to produce seed for active re-planting efforts.

While hunting for ginseng can be a fun and profitable hobby, there is also a responsibility to dig sustainably. Being a successful ginseng steward requires care, patience, restraint, and active management of wild ginseng populations.

WHO IS THIS FOR?

- Forest landowners
- Recreational foragers
- Commercial harvesters
- Nontimber forest product businesses
- Consumers
- Resource conservation agency personnel

WHAT WILL YOU LEARN?

- Ginseng identification
- Biology

Ginseng Farming: Plant Your Own Patch

Be introduced to one of Pennsylvania's most valuable woodland crops, and the basics of cultivation on forestlands.

#WBN-G-2482 | BE THE FIRST TO LEAVE A REVIEW

WEBINARS

LANGUAGE:
English

LIVE WEBINARS

September 29, 2021 | 7:30pm ET | FREE

September 29, 2021 | 7:30pm ET | FREE

FREE

Interested in native plants? Enjoy spending time in the woods? Looking for a way to diversify income or help cover annual forestland ownership costs? Establishing or "farming" American ginseng on forestlands is a fascinating and potentially profitable activity that can contribute to both plant and forest conservation. During **Ginseng Farming: Plant Your Own Patch**, participants will be introduced to one of Pennsylvania's most valuable woodland crops, and the basics of cultivation on forestlands.

This event is being offered at no charge to participants. Registration is required to receive the link to access the webinar. Registrants will also receive access to the webinar recording.

- Commercial harvesters
- Nontimber forest product businesses
- Consumers
- Resource conservation agency personnel

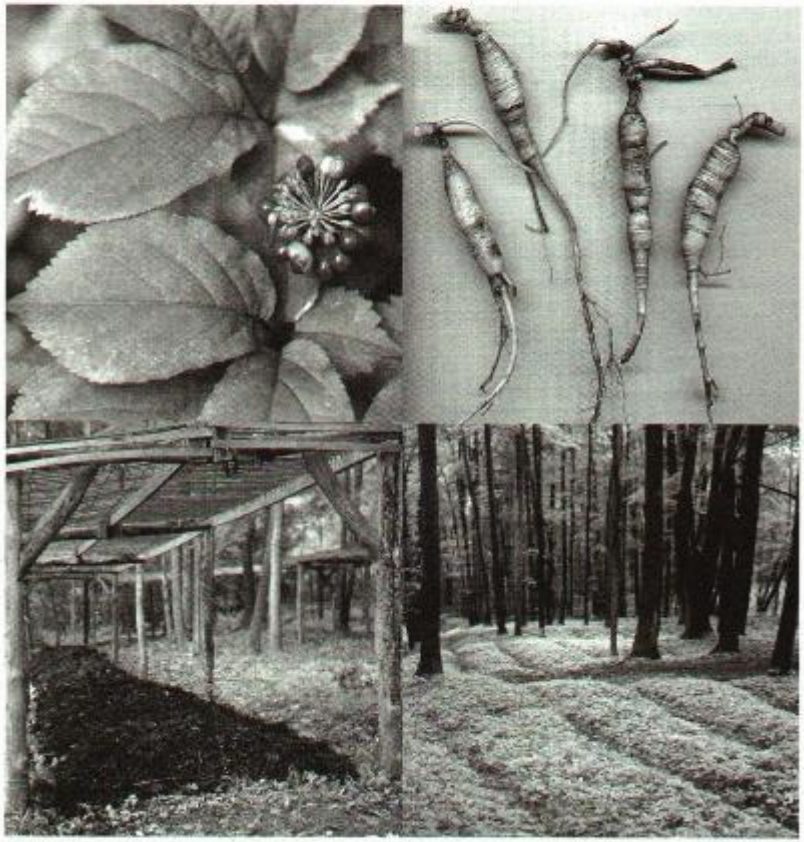
WHAT WILL YOU LEARN?

- Forest landowners
- Recreational foragers
- Commercial harvesters
- Nontimber forest product businesses
- Consumers
- Resource conservation agency personnel

5

Forest Finance

Opportunities from Ginseng Husbandry in Pennsylvania



PENNSTATE

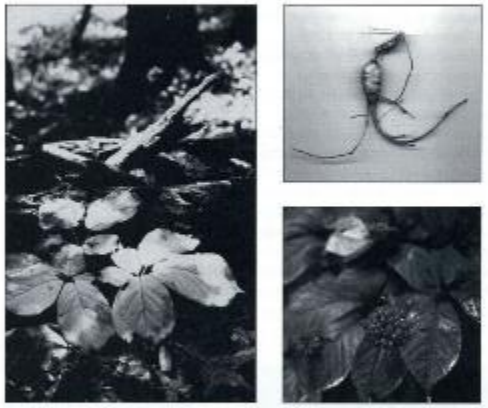
College of Agricultural Sciences

Agricultural Research and Cooperative Extension

Nontimber Forest Products (NTFPs) from Pennsylvania 1.

American ginseng

(*Panax quinquefolius* L.)



PENNSTATE

College of Agricultural Sciences

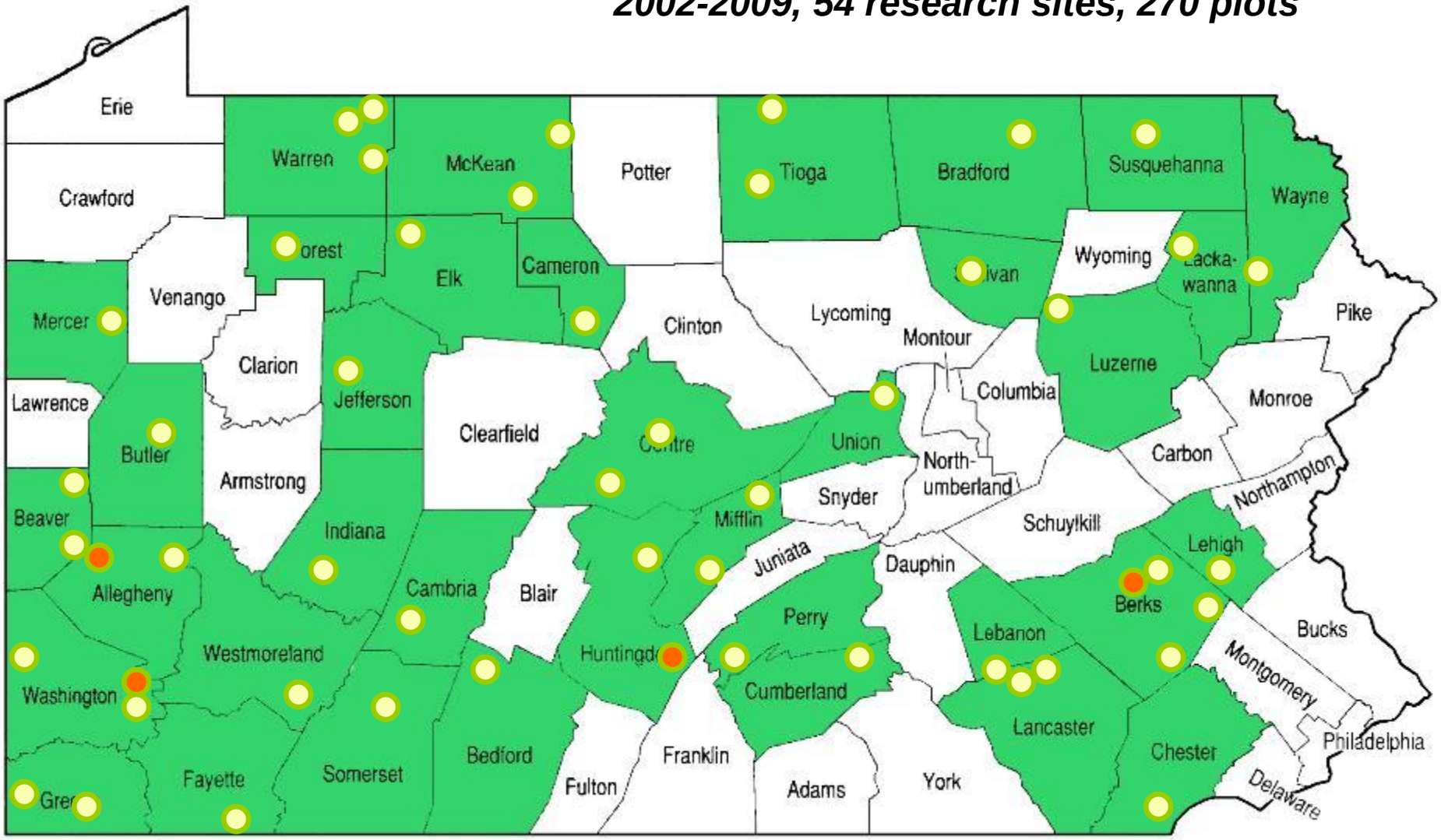
Agricultural Research and Cooperative Extension

Forest farming

An agroforestry practice in which specialty crops are introduced or husbanded in a forest that is managed to provide conducive growing conditions through forest stand improvements.

PA ginseng associations field study locations:

2002-2009, 54 research sites, 270 plots



American ginseng (*Panax quinquefolius* L.) floristic associations in Pennsylvania: guidance for identifying calcium-rich forest farming sites

Eric P. Burkhart

Abstract In the eastern United States, there is interest among forest landowners in American ginseng husbandry, and particularly in cultivating this plant on forestlands using a wild-simulated forest farming approach. This study documented the flora and soil conditions associated with wild and wild-simulated ginseng populations throughout Pennsylvania (PA) to develop floristic "indicators" that can be used to identify supportive growing sites on forestlands. A total of 243 plant species were documented associates of ginseng across PA: 32 over-story trees, 37 shrubs and understory trees, 15 vines, 143 herbs, and 16 ferns. Statistical analysis revealed a largely shared floristic assemblage throughout the state although some associates did differ according to region and physiographic province. Previous studies have suggested that a soil calcium content, especially soils having at least 3,360 kg ha^{-1} (3,000 lbs ac), appear to be particularly conducive to wild and wild-simulated ginseng occurrence and/or vigor, and indicator species analysis in this study revealed that three of the top plant associates that can be used for determining sites that meet this calcium threshold in PA are white ash, Jack-in-the-pulpit, and rattlesnake fern. These results suggest that successful adoption of wild-simulated ginseng forest farming is likely to be improved in forested areas where these species are found collectively as a dominant component of local plant assemblages.

Agroforest Syst (2013) 87:1157–1172

PENNSTATE

(814) 863-0841 Fax (814) 863-4540

Agricultural Analytical Services Laboratory
The Pennsylvania Sta
University Park PA 16
http://www.aasl.psu.ed

SOIL TEST REPORT FOR:	ADDITIONAL COPY TO:
	ERIC P BURKHART P O BOX 448 PINE GROVE MILLS PA 16868

DATE	LAB #	SERIAL #	COUNTY	ACRES	FIELD ID
07/15/2008	S08-01215	74048	Beaver		Sang-prob

SOIL NUTRIENT LEVELS				Deficient	Optimum	Exceeds Crop Needs
Soil pH		4.3				
Phosphate	(P_2O_5)	485	lb/A			
Potash	(K_2O)	74	lb/A			
Magnesium	(MgO)	76	lb/A			
Calcium	(CaO)	438	lb/A			

Recommendations For: *GINSENG-MAINTAIN*

Limestone and Magnesium:

Calcitic Limestone (calcium carbonate equivalent): 3000 lb/A

Magnesium (Mg): 150 l

Limestone containing 5% Mg (8 % Mg magnesium requirement

Plant Nutrient Needs:

Nitrogen (N):	Phosphate (P_2O_5):	Potash (K_2O):
35 lb/A	NONE	30 lb/A

MESSAGES

Ginseng thrives in a high organic matter, "woodsy" soil with an acid pH range of low to medium fertility. It also requires 75% shade with free air circulation, so use forest canopy or wood lath .

Apply up to a 4 inch thick layer of finely chopped acid leaf (oak or pine) compost or leaf mold before you add any of the recom

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If only
If only
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LABO
pH
4.3
Test M

SOIL NUTRIENT LEVELS

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Agricultural Analytical S
The Pennsylvania State
University Park PA 1680
http://www.aasl.psu.edu

SOIL TEST REPORT FOR:	ADDITIONAL COPY TO:
	ERIC P BURKHART P O BOX 448 PINE GROVE MILLS PA 16868

DATE	LAB #	SERIAL #	COUNTY	ACRES	FIELD ID	S
07/15/2008	S08-01216	74049	Beaver		Sang Ok	

SOIL NUTRIENT LEVELS				Deficient	Optimum	Exceeds Crop
Soil pH		4.1				
Phosphate	(P_2O_5)	476	lb/A			
Potash	(K_2O)	58	lb/A			
Magnesium	(MgO)	80	lb/A			
Calcium	(CaO)	550	lb/A			

Recommendations For: *GINSENG-MAINTAIN*

Limestone and Magnesium:

Calcitic Limestone (calcium carbonate equivalent): 4000 lb/A **Magnesium (Mg):** 150 lb/

Limestone containing 3.8% Mg (6 % Mg
magnesium requirement

Plant Nutrient Needs:

Nitrogen (N):	Phosphate (P_2O_5):	Potash (K_2O):
35 lb/A	20 lb/A	30 lb/A

MESSAGES

Ginseng thrives in a high organic matter, "woodsy" soil with an acid pH range of low to medium fertility. It also requires 75% shade
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SOIL NUTRIENT LEVELS

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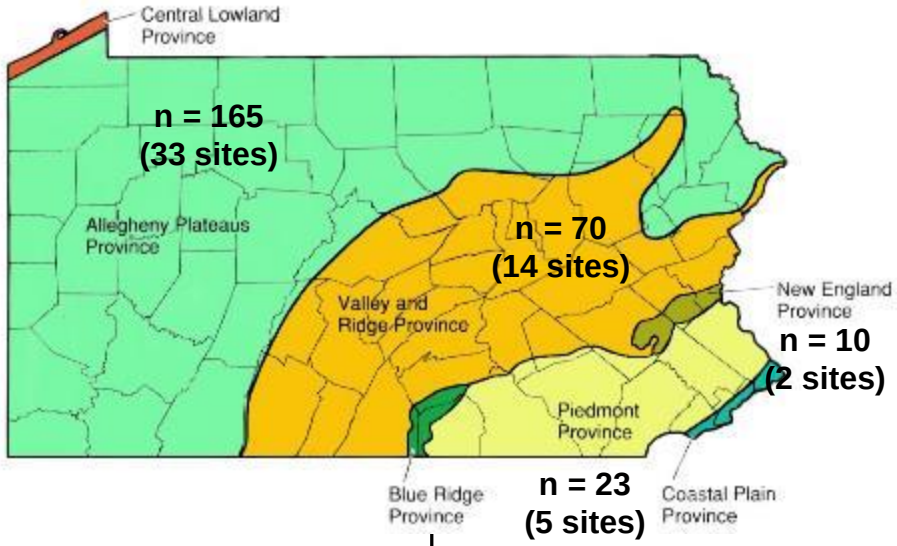
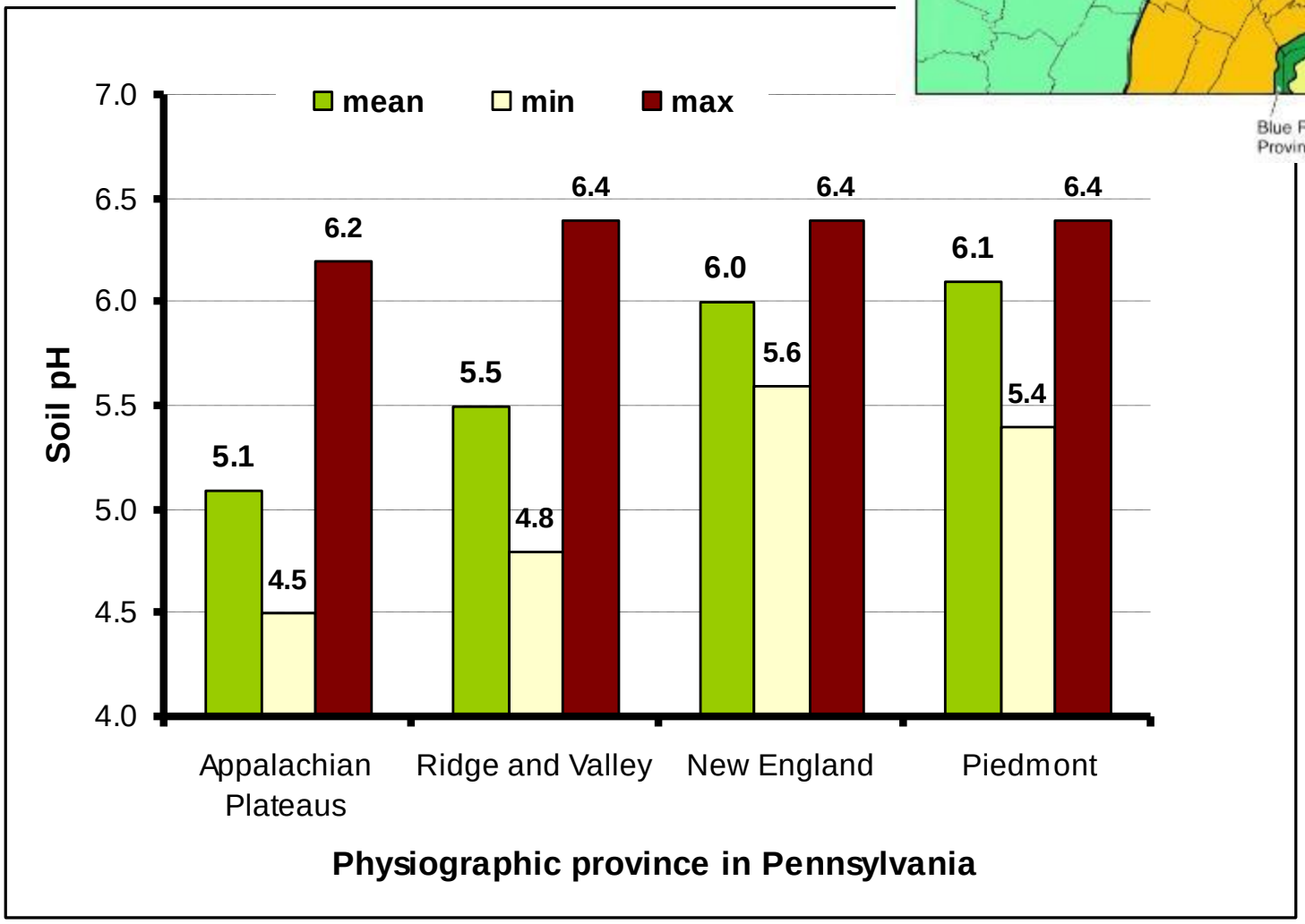
Recommendations For: *GINSENG-MAINTAIN*


Central Lowland Province
n = 165
(33 sites)
Allegheny Plateaus Province
n = 70
(14 sites)
Valley and Ridge Province
New England Province
n = 10
(2 sites)
Piedmont Province
n = 23
(5 sites)
Blue Ridge Province
Coastal Plain Province


mean
min
max
Soil pH
7.0
6.5
6.0
5.5
5.0
4.5
4.0
5.1
4.5
6.2
5.5
4.8
6.4
6.0
5.6
6.4
6.1
5.4
6.4
Appalachian Plateaus
Ridge and Valley
New England
Piedmont
Physiographic province in Pennsylvania

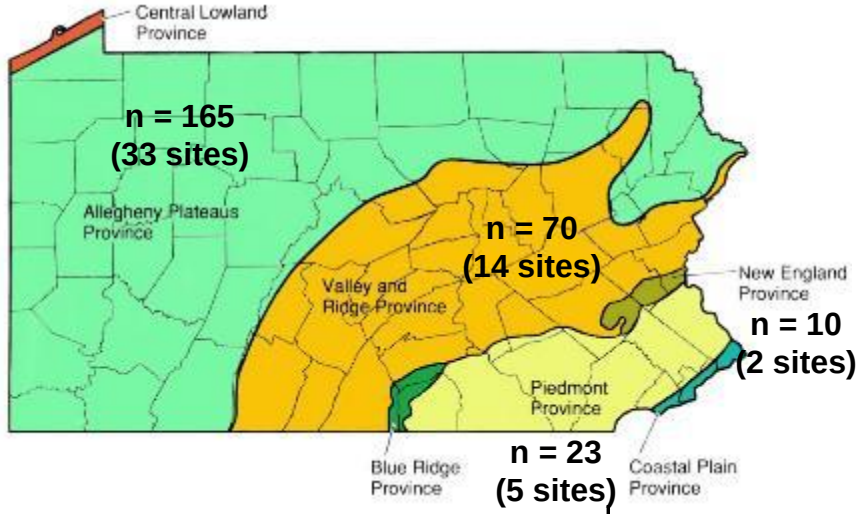
Can. J. Bot. 74: 1104-1112 (1996)

Vesicular–arbuscular mycorrhizal associations of American ginseng (*Panax quinquefolius*) in commercial production

Fraser Whitbread, Terry P. McGonigle, and R. Larry Peterson

Abstract: *Panax quinquefolius* L. (American ginseng) roots collected from 1st year seedlings and 3-year-old plants on three commercial farms were colonized by vesicular–arbuscular mycorrhizal (VAM) fungi. Roots collected from ginseng plants in a managed maple–beech woodlot were also colonized by VAM fungi. Fungal hyphae entered roots either directly through root hairs or by forming appressoria on the surface of epidermal cells from which penetration hyphae formed. Hyphae colonized roots by passing intracellularly through cortical cells. Hyphal coils, from which arbuscular branches formed, were typical of the *Paris*-type of VAM association. The extent of colonization by hyphal coils and by arbuscules varied between 1-year-old and 3-year-old plants and among farms. The seasonal maxima for colonization differed among combinations of farms and plant age-classes in such a way as to suggest that a significant degree of the variability was due to characteristics of the individual seed beds. Over the season, we saw earlier development of hyphal coils that was only later exceeded by production of arbuscules; this pattern is consistent with the *Paris*-type morphology observed, in that arbuscule branches develop from hyphal coils. However, the speed at which arbuscules developed at some points in the season was so great that at those times the transition from newly formed hyphal coils to arbuscules must be extremely fast. Vesicles were rarely found in any root samples examined.

Key words: ginseng, *Panax quinquefolius*, vesicular–arbuscular mycorrhiza, commercial farms.


Central Lowland Province
n = 165
(33 sites)
Allegheny Plateaus Province
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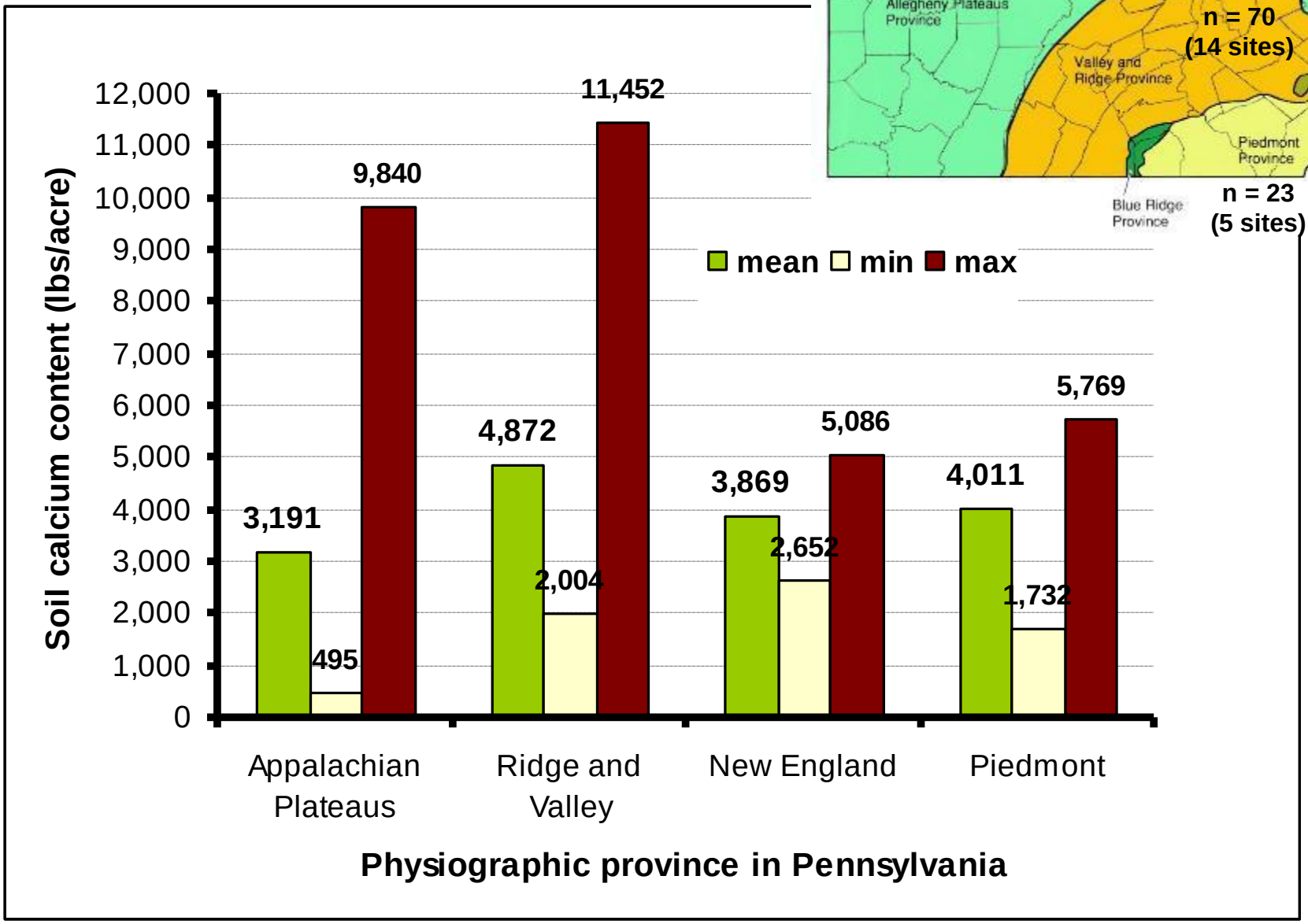
Coastal Plain Province


Soil calcium content (lbs/acre)
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
mean
min
max
3,191
495
9,840
4,872
2,004
11,452
3,869
2,652
5,086
4,011
1,732
5,769
Appalachian Plateaus
Ridge and Valley
New England
Piedmont
Physiographic province in Pennsylvania

Can. J. Plant Sci. 83: 603-609 (2003)

The impact of lime and organic fertilization on the growth of wild-simulated American ginseng

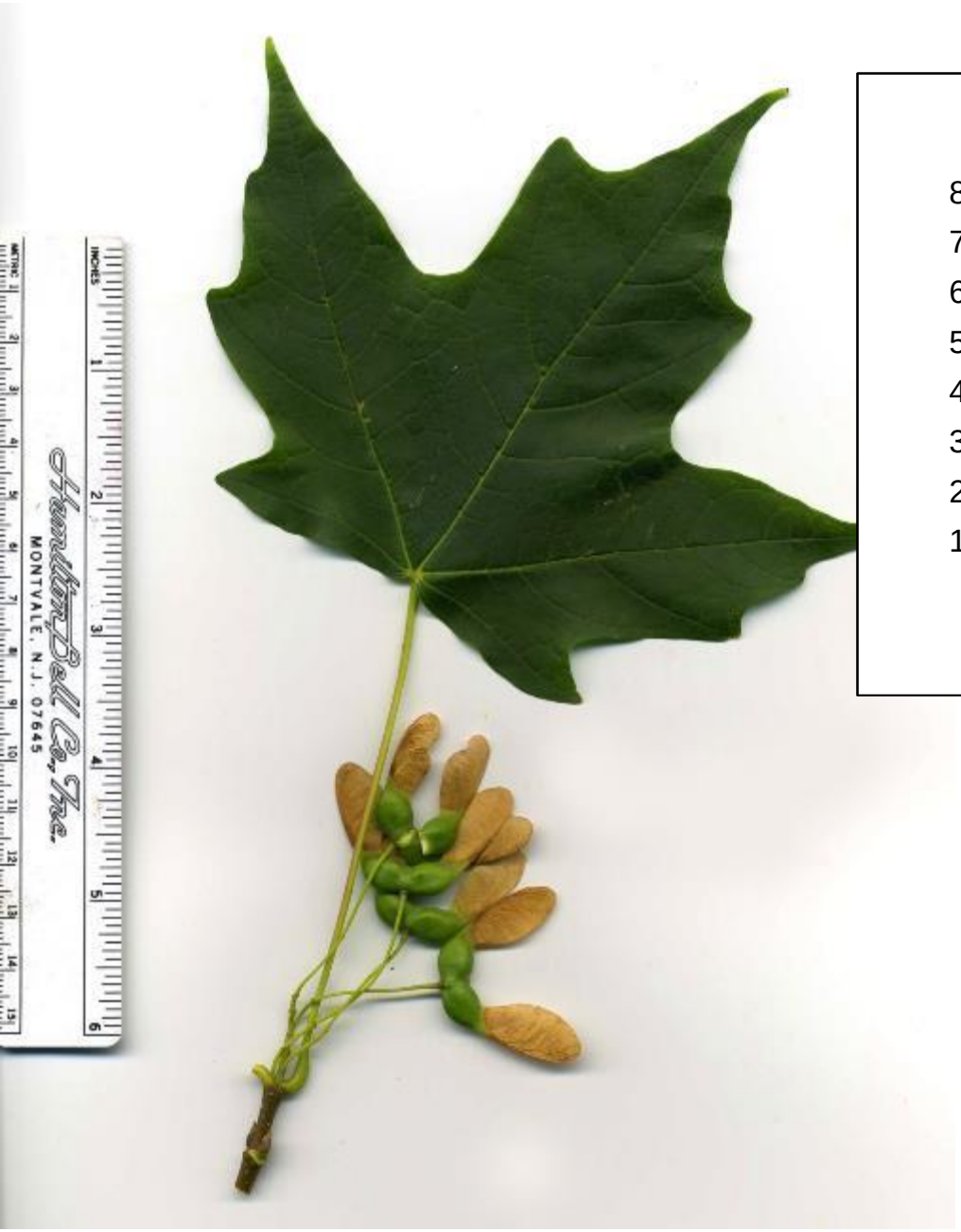
I. Nadeau[1], R. R. Simard[2,†], and A. Olivier[1,3]

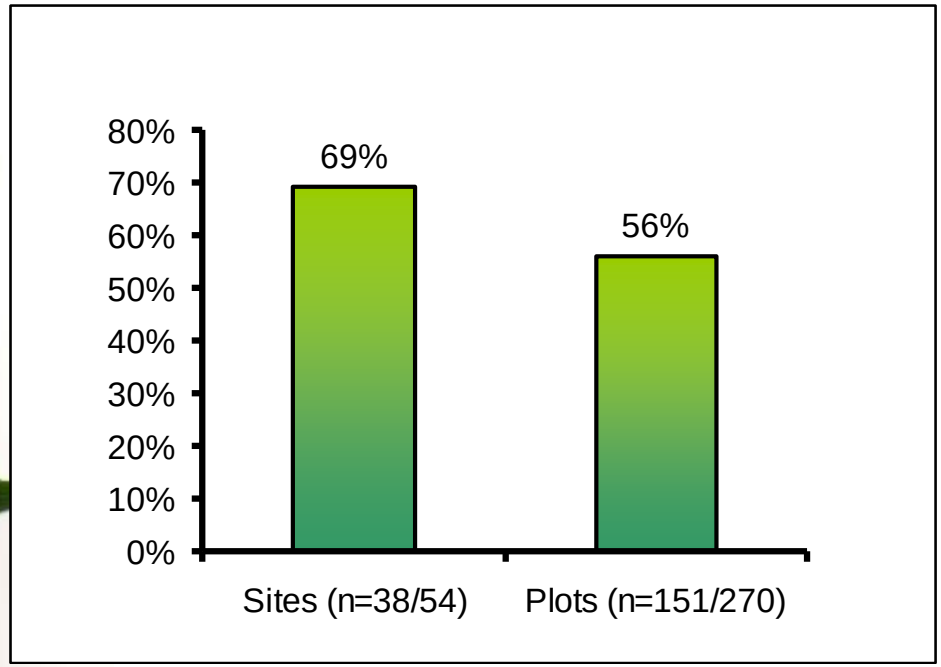
[1]*Département de phytologie, Université Laval, Québec, Québec, Canada G1K 7P4;* [2]*Agriculture and Agri-Food Canada, 2560 boul. Hochelaga, Québec, Québec, Canada G1V 2J3.* *Received 17 April 2002, accepted 26 February 2003.*

Nadeau, I., Simard, R. R. and Olivier, A. 2003. **The impact of lime and organic fertilization on the growth of wild-simulated American ginseng.** Can. J. Plant Sci. **83**: 603–609. A 5-yr experiment was undertaken in a red maple forest to evaluate the effects of lime and organic fertilizer application on the growth parameters of wild-simulated American ginseng growing on a very acidic soil. The application of lime had a positive impact on ginseng emergence and survival rate; it also significantly increased soil Ca, as compared to no application (control). During the last years of the experiment, adding lime also increased leaf area, as well as shoot and root mass of ginseng. Adding lime and organic fertilizer together positively affected ginseng survival rate and root mass, as compared to adding lime alone. These results indicate that liming can improve the growth and survival of American ginseng during the first 5 yr of its development in this very acidic maple forest soil. The improvement could be due, at least partly, to increased Ca content in the soil. Addition of organic fertilizer would be beneficial as long as sufficient Ca^{2+} is provided to alleviate the Al toxicity of this soil. Thus, using such cultural practices, wild-cultivation of American ginseng, even in red maple forests, could constitute a valuable alternative to field-cultivation.

Key words: Calcium, lime, organic fertilization, *Panax quinquefolius*, wild-simulated cultivation


85 trees,
shrubs,
and vines

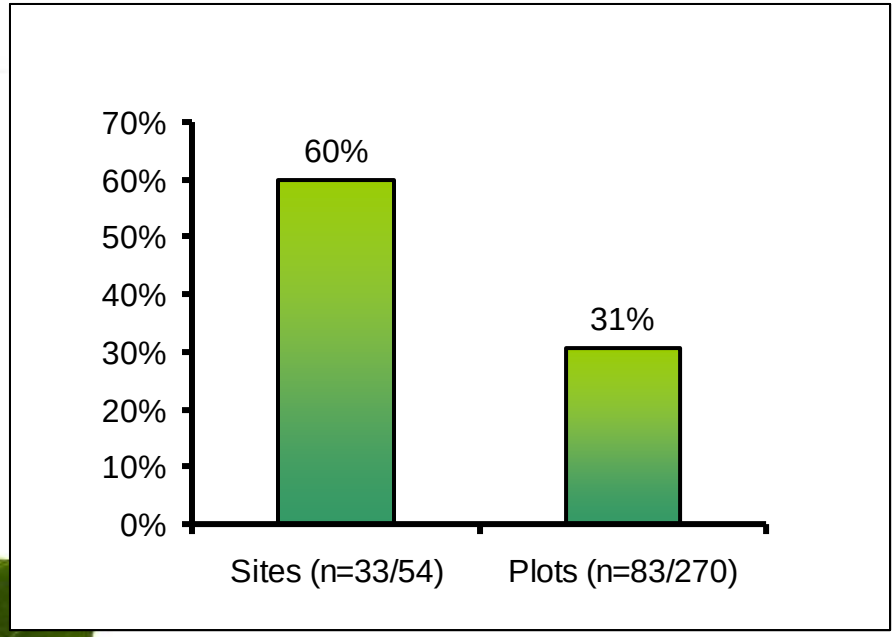




#1

Sugar maple

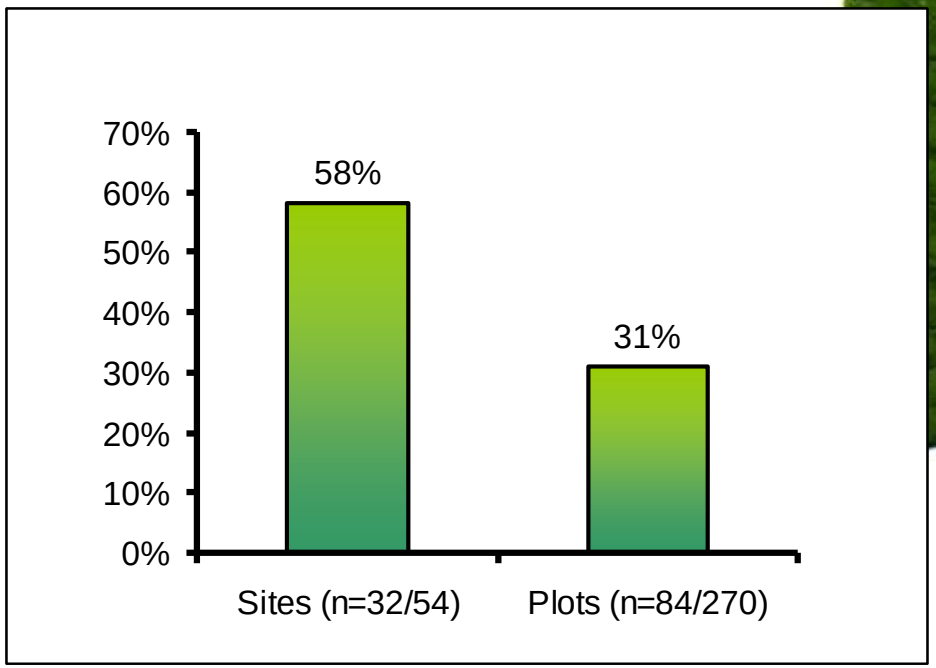
Acer saccharum



#2

White ash

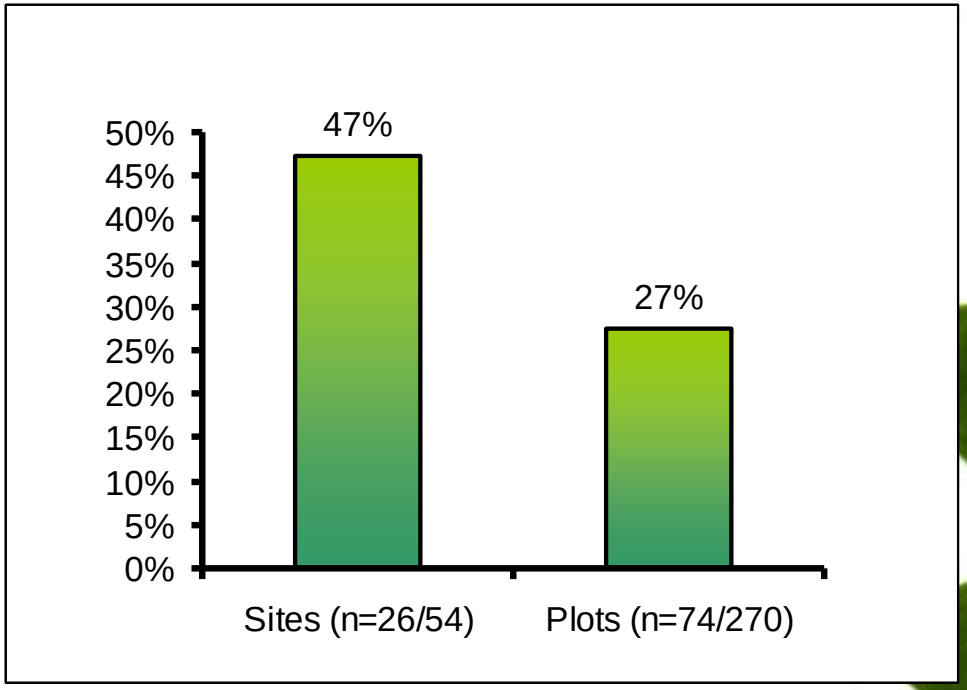
Fraxinus americana



#3

Basswood

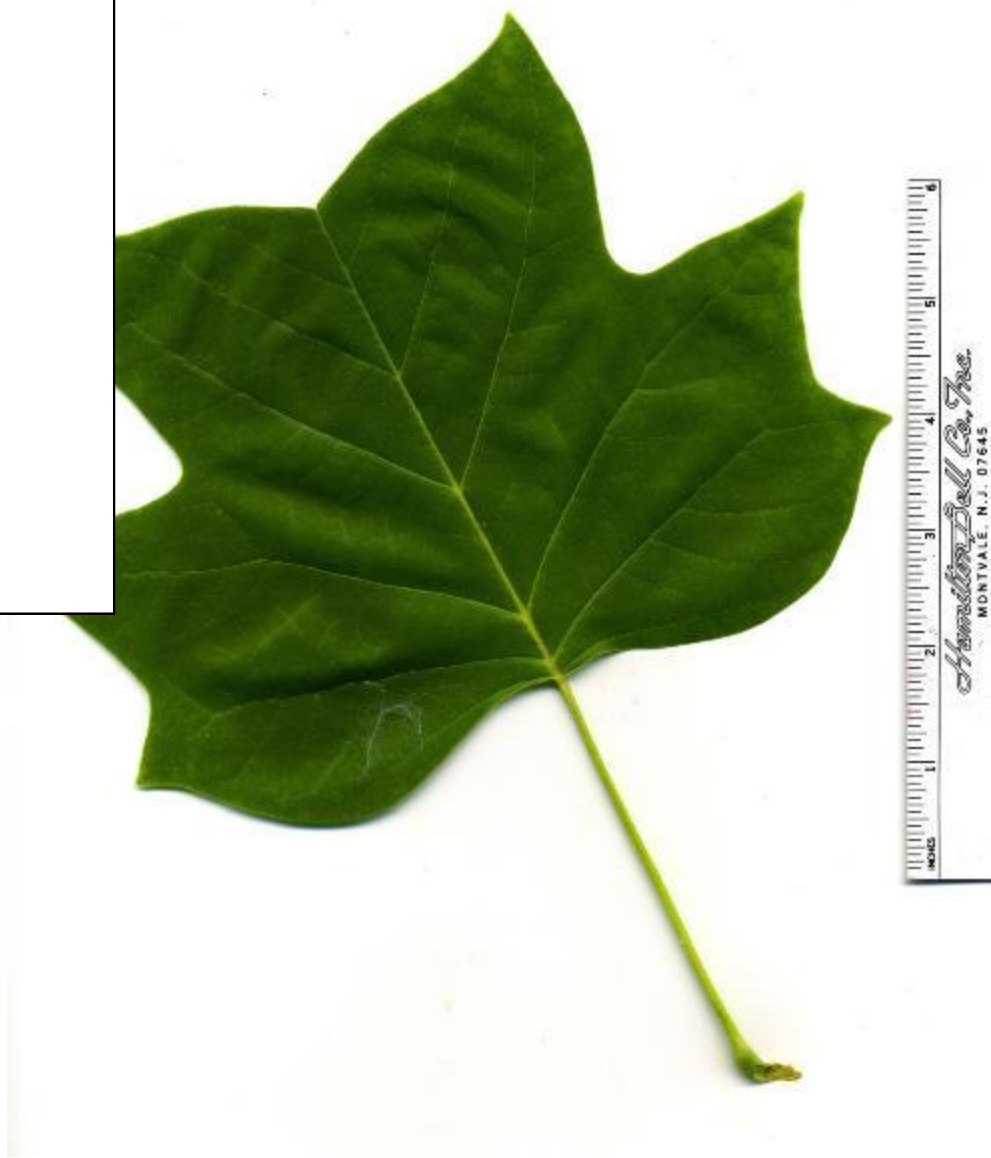
Tilia americana

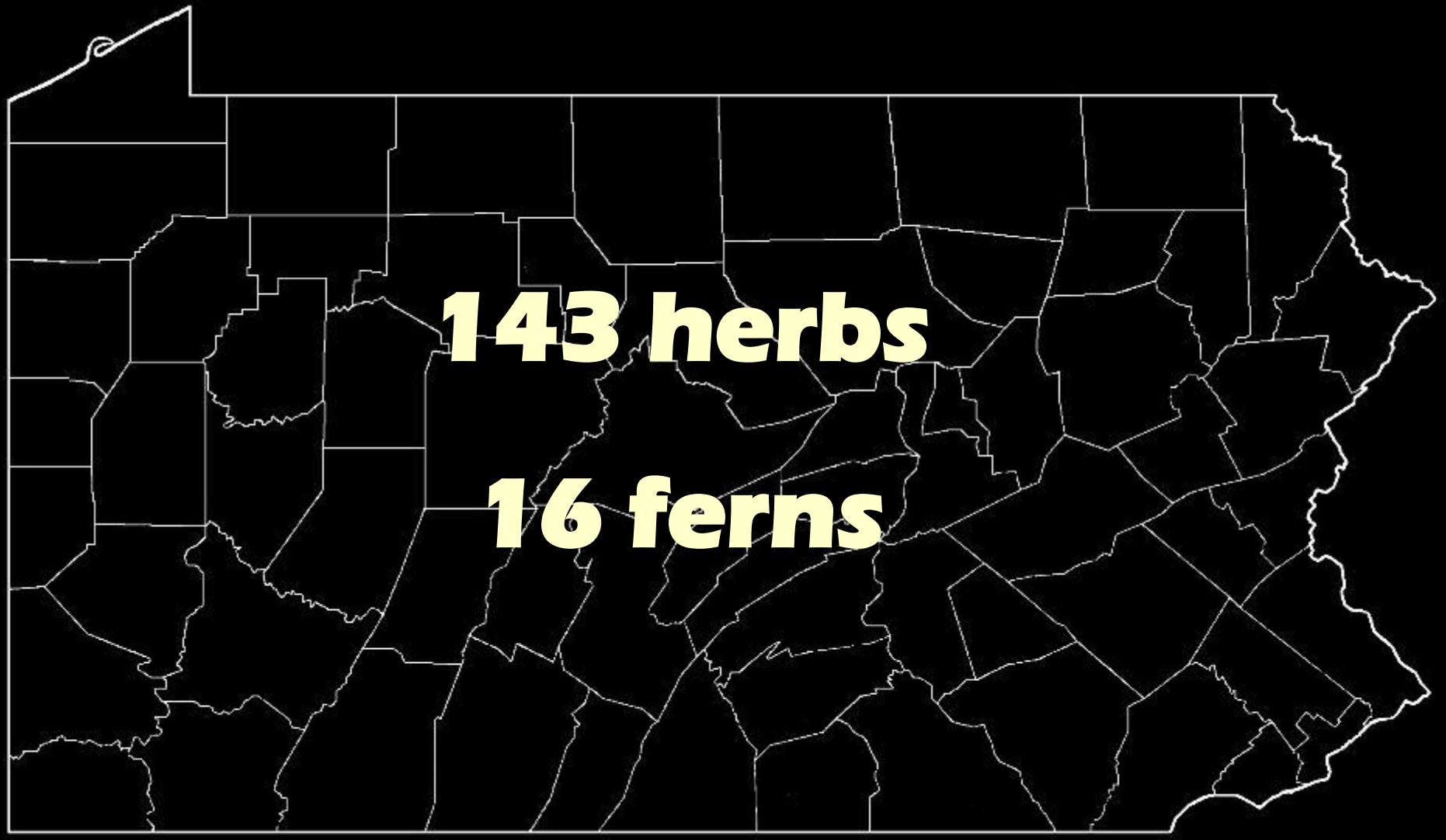


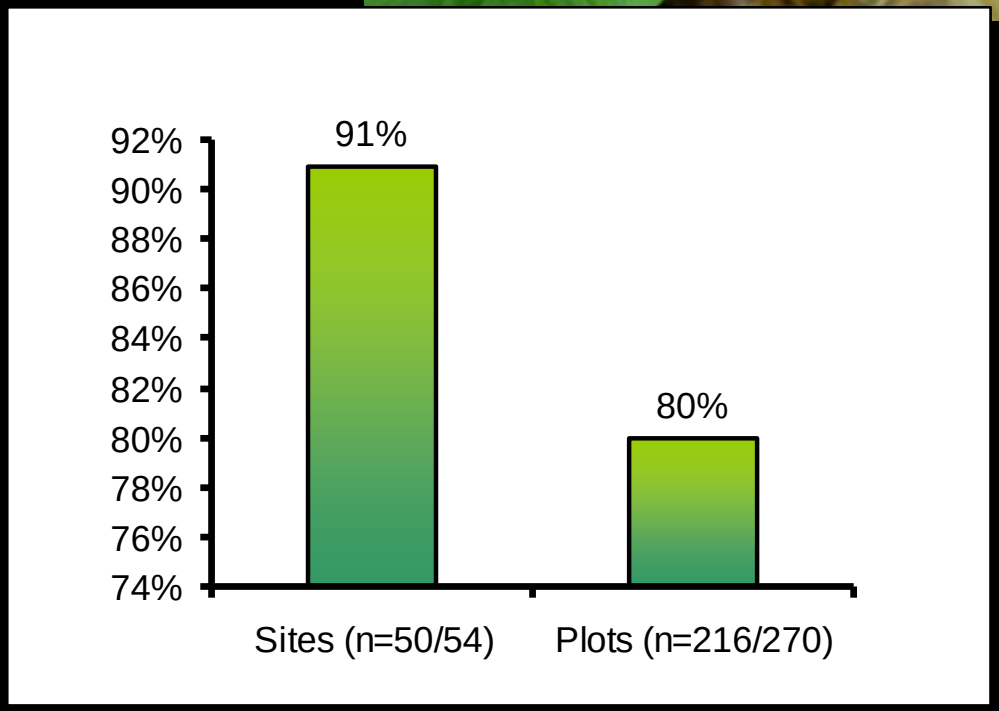
#4

Tulip poplar

Liriodendron tulipifera



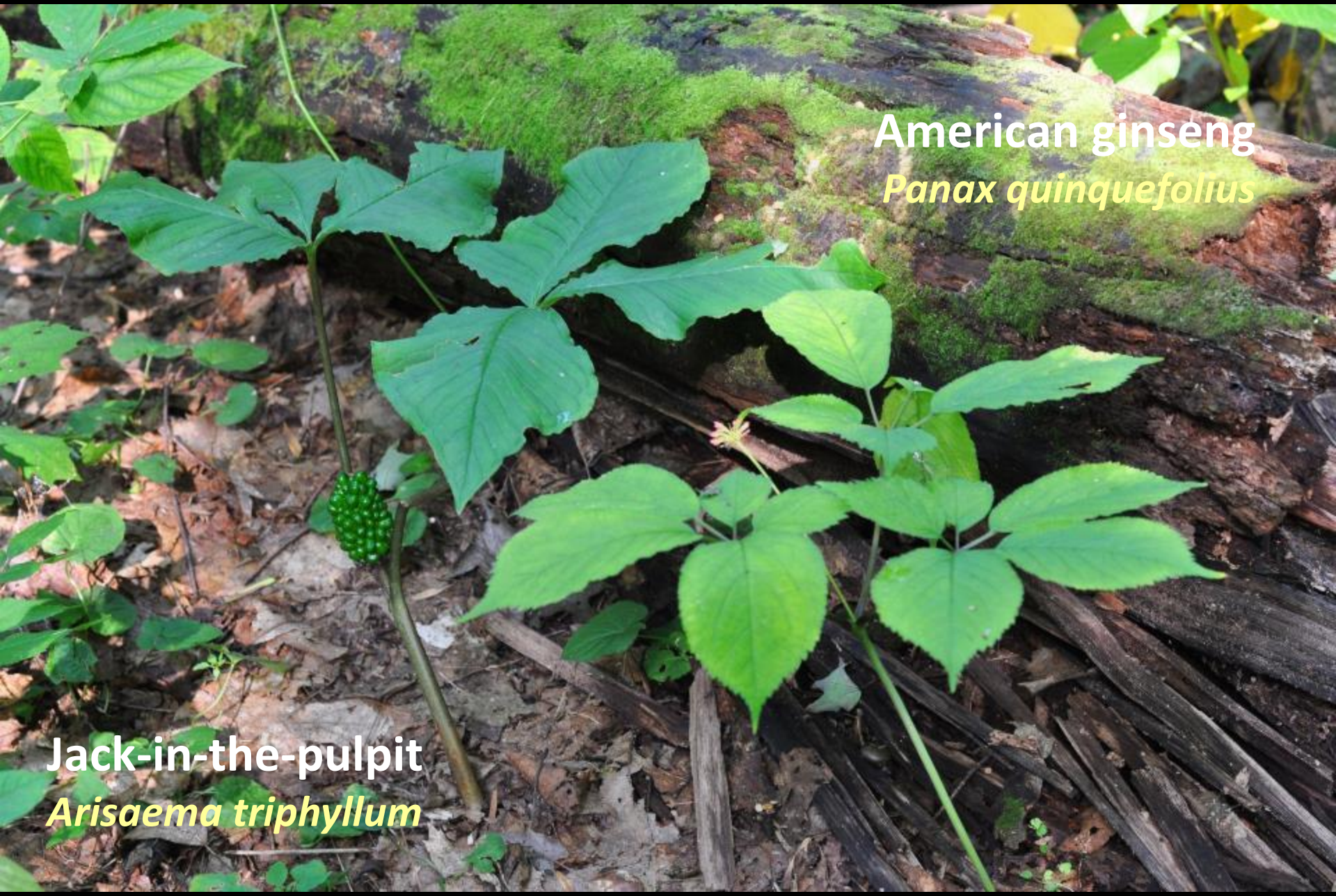

143 herbs
16 ferns



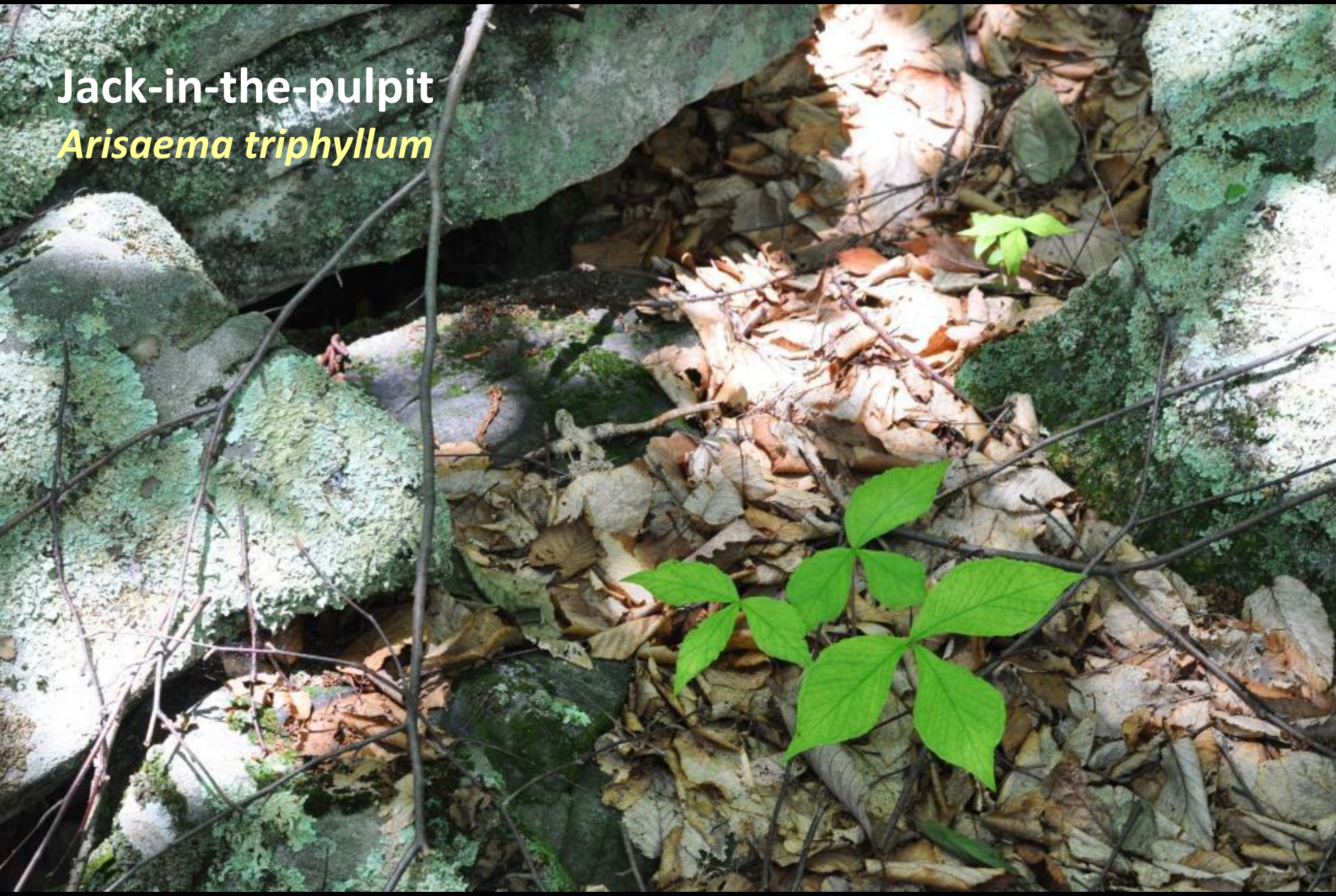
#1

Jack-in-the-pulpit

Arisaema triphyllum


American ginseng
Panax quinquefolius
Jack-in-the-pulpit
Arisaema triphyllum


Jack-in-the-pulpit
Arisaema triphyllum


Jack-in-the-pulpit
Arisaema triphyllum

Sang habitat

Understory “indicators”

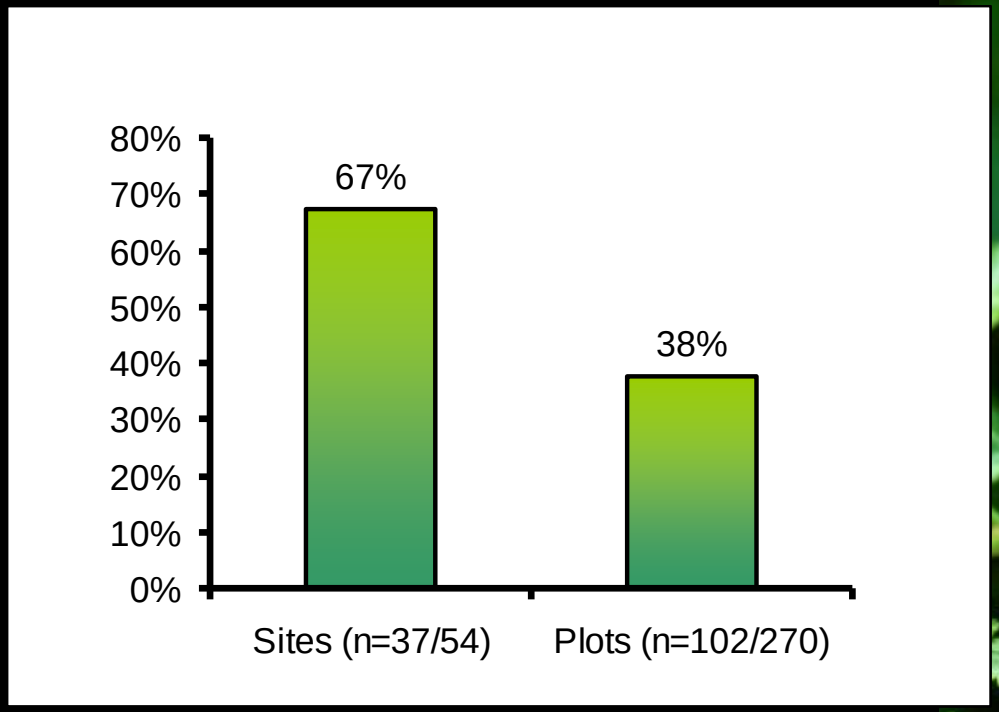
+

Overstory “indicators”

#2

Rattlesnake fern

Botrychium virginianum



A writer in the "Fern Bulletin" states that in parts of Kentucky the rattlesnake-fern is known as "sang sign," because it is believed that the tip of the frond always points towards a ginseng plant. The suggested explanation, which is probably the correct one, is that both these plants grow in similar situations, and it would often happen that the grape-fern would point in the direction of the other plant. In other parts of the South the fern is also called "indicator" for the same reason.

FERNS

A MANUAL FOR THE NORTHEASTERN STATES

WITH ANALYTICAL KEYS BASED ON THE STALKS AND ON THE FRUCTIFICATION

With over Two Hundred Illustrations from Original Drawings and Photographs

BY

CAMPBELL E. WATERS

(Ph.D., Johns Hopkins)

NEW YORK
HENRY HOLT AND COMPANY
1903

THE JOURNAL OF

AMERICAN FOLK-LORE.

VOL. VII. — APRIL–JUNE, 1894. — NO. XXV.

POPULAR AMERICAN PLANT-NAMES.

III.

IN this paper the writer has, for convenience, discarded the systematic arrangement of names of genera, under families, and adopted the alphabetical arrangement. It has also seemed best, in view of the threatened revolution in nomenclature, to give the authorities for the scientific names used, as far as these could be conveniently ascertained. In a few instances the Spanish names of species (mainly of the Pacific coast region) have been given, but it has been the writer's intention to insert these only when they are commonly current among English-speaking people as well as among the Mexicans.

OPHIOGLOSSACEÆ.

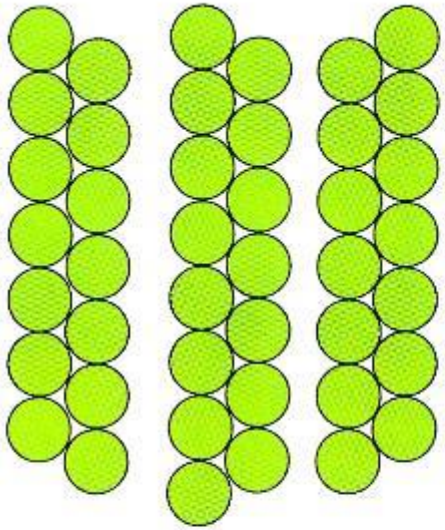
Botrychium Virginianum, Swartz, indicator,[7] Jackson, West Va.

[7] Name derived from the fact that its growth is thought to indicate the presence of ginseng.

Forest Farming Method	Management Intensity
Woods Grown	Woods grown, also known as forest gardening, is most intensive. In addition to potential thinning of the forest overstory, it often involves clearing undesirable vegetation in the understory and other practices that are more closely related to agronomy (e.g., tillage, fertilization, weeding, and control of disease, insects, and wildlife). Due to costs associated with input levels, forest gardening can be costly and time consuming but can render large NTFP yield.
Wild-Simulated	Wild-simulated is the cultivation of NTFPs in natural growing environments. A natural growing environment can deliver products similar in appearance and quality to plants naturally growing in the wild. Rather than administer intensive agronomic practices, wild simulated forest farmers use minimally invasive techniques to expose the soil, and plant seeds or plants. Fertilizers and pesticides are rarely used. Despite potential decreases in total yields, wild simulated products often have higher priced markets when compared to those that are more intensively cultivated.
Managed Wild Population	Managed wild populations involves working with plants or fungus that already exist. The forest canopy may be modified to favor growth of desirable NTFPs. Understory plants that are competing with the desired species may be removed. Annual harvests might not be possible. Inputs are very low and yields vary depending on the species and how often it is harvested.
Wild-Harvest or Wild-Craft	Wild-harvesting is the harvesting of NTFPs growing naturally in the forest. It is not generally considered forest farming because active management is not involved. There are no inputs and no risks. There are sustainable wild-harvest methods that can be followed to ensure future harvests.

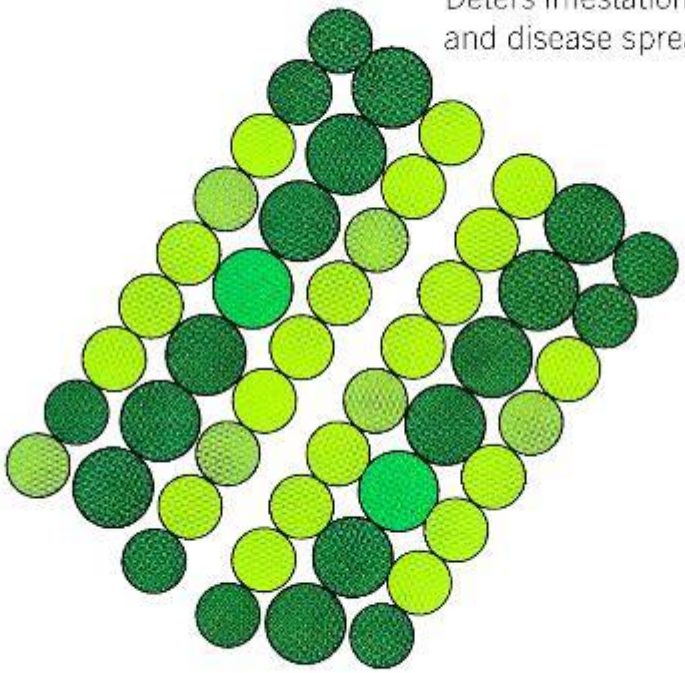
Each forest farming method has advantages as well as potential drawbacks in terms of time and money, which also varies by crop. For example, woods grown ginseng may result in a greater yield when compared to wild-simulated but per weight value may be lower. Successful forest farmers have a good sense of available markets and NTFP prices and match method and product to maximize revenue.

MONOCULTURE



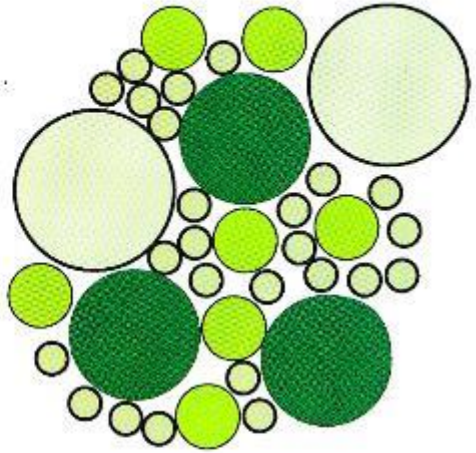
Linear habitat encourages pest infestation and the rapid spread of disease.

COMPANION PLANTING



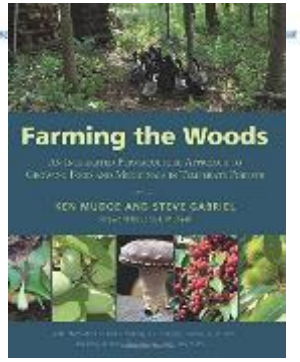
Deters infestation and disease spread.

POLYCULTURE GUILDS



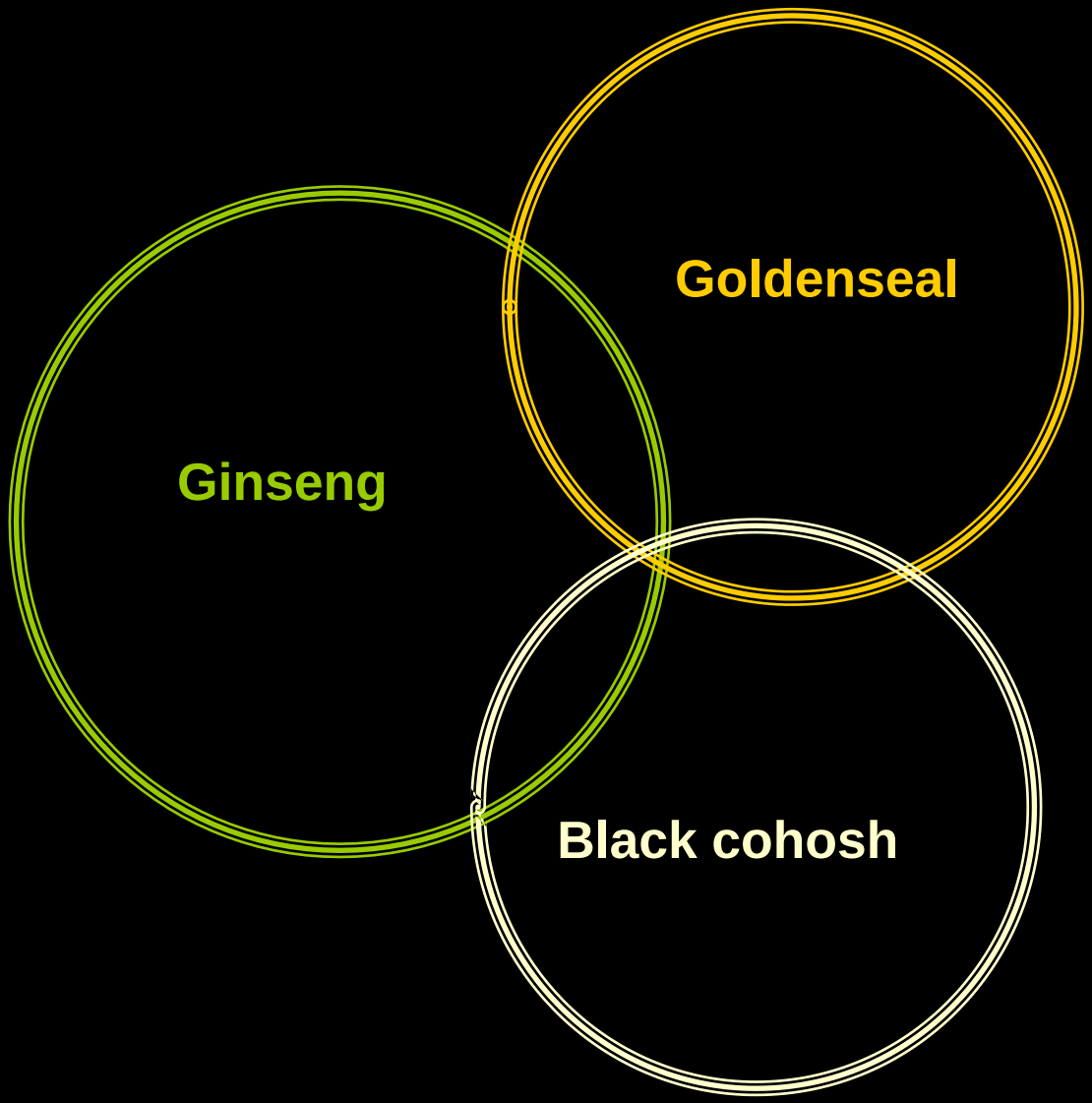
Diversity disrupts invasive patterns and buffers disturbances to the system. Guilds add pest predators to the crop area.

Progressive diversity benefits the ecology.

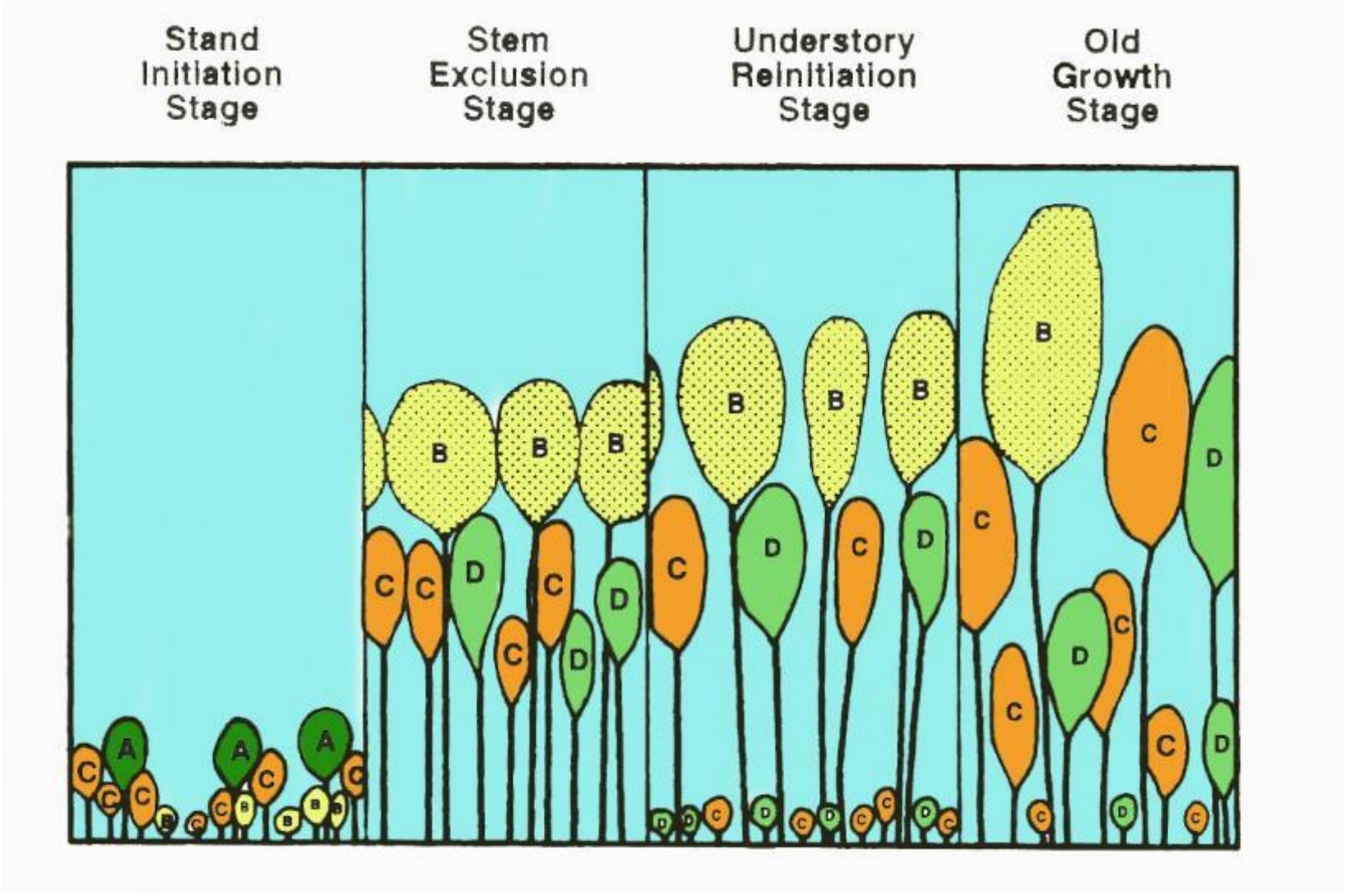


Alternaria panax


Phytophthora cactorum



Polyculture



Tree selection can be used to favor “crop” trees

Importance of environmental factors on plantings of wild-simulated American Ginseng

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Abstract American ginseng (*Panax quinquefolius* L.) is an herbaceous perennial plant native to the forests of eastern North America with a long history of use and harvest, and with a significant international market. To supply international demand, the plant is grown in the USA and Canada under artificial shade cloth. However, wild and wild-appearing ginseng roots command prices up to 100 times greater than roots cultivated in a field: $550–2200 (US$ dry kg) vs. $20–70 (US$ dry kg). Growing ginseng in a forested environment using a "wild-simulated" forest farming approach, where growers introduce ginseng into a forested environment and then let it grow with little to no intervention, allows forest farmers to access these higher prices and meet international demand. As climate change shifts growing conditions globally, there will be increasing opportunities for the forest farming of American ginseng internationally. In this study, we examined the main drivers of ginseng growth and development in a wild-simulated ginseng forest farm. We measured the range of environmental conditions and built statistical models to examine which factors were most important for ginseng vigor. We found that the amount of sunlight, even under highly shaded conditions, was the most important driver of ginseng establishment on the landscape, as well as ginseng plant size and development. Prior research indicates that additional factors including soil nutrient levels, moisture, and texture are important for the survival, growth, and development of wild and planted American ginseng, but our study did not show significant patterns of importance at this site. Our findings suggest that integrating silvicultural techniques such as forest thinning may enhance the productivity of wild-simulated ginseng operations while providing additional forest-based income with minimal impact on natural forest ecosystems.

Thinning “waste” put to work

White tail deer

Odocoileus virginianus


Jewelweed
Impatiens capensis
Pale jewelweed
Impatiens pallida


Jewelweed
Impatiens capensis

Jumping woodland mouse
Napaeozapus insignis

Woodland vole

Microtus pinetorum

Photo: R. Beyfuss

Wild turkey

Meleagris gallopavo

Eastern chipmunk

Tamias striatus

Comparing Ginsenoside Production in Leaves and Roots of Wild American Ginseng (*Panax quinquefolius*)

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ABSTRACT

American ginseng, *Panax quinquefolius* L., is an herbaceous perennial species that is destructively harvested for its bioactive compounds called ginsenosides. The demand for this herb fosters illegal poaching and over-harvesting that reduces genetic variability and population viability. Five wild populations in western North Carolina were studied to better understand the production of ginsenosides in leaf and root tissues. Total ginsenoside concentration was significantly higher in leaves than roots, though total yield was higher in roots due to greater root biomass. However, some ginsensosides (Rb2, Rd and Re) had higher or more consistent yields in leaves than roots, so might be developed into a sustainable source of these medicinally-active compounds. Additionally, we identified regional root chemotypes that differed in the production of the ginsenosides Rg1 and Re and could be developed into regional cultivars depending on the desired panel of ginsenosides.

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Forest Grown

2019

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