



Site Factors Associated with Natural Populations of Ginseng in Arkansas

Author(s): Michael S. Fountain

Source: *Castanea*, Vol. 47, No. 3 (Sep., 1982), pp. 261-265

Published by: Southern Appalachian Botanical Society

Stable URL: <https://www.jstor.org/stable/4033089>

Accessed: 27-05-2022 21:44 UTC

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

Southern Appalachian Botanical Society is collaborating with JSTOR to digitize, preserve and extend access to *Castanea*

**Site Factors Associated with Natural Populations
of Ginseng in Arkansas**
MICHAEL S. FOUNTAIN

ABSTRACT

Twelve natural populations of ginseng (*Panax quinquefolium* L.) located in four of the major physiographic provinces in Arkansas were studied. Soil samples were analyzed for the major nutrients, pH, percent organic matter and texture. The typical soil on which the populations were found would be classified as a moderately acid clay soil with moderate to high fertility. A typical topographic position would be a gentle to moderately steep, well-drained midslope with a northeastern exposure.

Natural populations of ginseng (*Panax quinquefolium* L.) can be found throughout much of the mountainous regions of northern and western Arkansas as well as in the Crowley's Ridge physiographic province in the eastern portion of the state. Roots of this species are harvested and exported to various countries or other states where they are processed into a wide variety of products of presumed medicinal value. This annual harvest has created concern over the current status of the species with regard to its ability to recover and perpetuate itself. However, no scientific evidence is available regarding the ecology and development of natural populations in Arkansas. Ginseng is cultivated as an agricultural or forest crop in several states and the extent of knowledge of this species arises from these operations. Methods and procedures for artificial propagation are fairly well documented (Williams and Duke 1978, Lewis 1980, Currie 1980, Jenkins 1980).

Due to annual harvest pressure on the natural ginseng populations, a study was initiated to monitor the status of the species. One portion of this research was to maintain records of the amount of ginseng root harvested and subsequently exported. The second portion of the research program was to locate populations within the various provinces that encompass the natural range of ginseng in Arkansas. This paper will summarize site factors associated with the occurrence of these native populations.

METHODS

Twelve natural populations were located in four major physiographic provinces. An effort was made to locate populations that were relatively undisturbed and could be adequately

protected from harvest. Three populations were found on Crowley's Ridge, four were located in northwest Arkansas (Boston Mountains province), two were located in the north-central section of the state (Springfield Plateau province), and three were found in the Ouachita Mountains province in extreme western Arkansas (Ark. Dept. of Planning 1974).

Samples from the top six inches of the soil profile were collected at each location. Analysis included the content of the major nutrients (P, K, Ca, Na, Mg) pH, percent organic matter (O.M.), and soil texture (% sand, silt, and clay).¹ Additionally, topographic variables including aspect, percent slope, slope shape, location on the slope, and drainage class were measured or estimated.

RESULTS

The typical soil on which these study populations were found would be classified as a moderately acid, clay soil with moderate to high fertility (Table 1). Analysis of variance for all variables in Table 1, except pH, revealed that the only variables statistically different between physiographic provinces were the potassium and calcium content. Samples taken from the Crowley's Ridge population were significantly different with regard to the level of calcium. This level (425 lbs/acre) is below the minimum (1200 lbs/acre) stated by Wilde (1958) to be necessary for satisfactory growth of black walnut, yellow-poplar and basswood. However these species were commonly found throughout the areas where the study populations were located indicating that the effects of the low calcium level were masked by other site factors.

Although the concentrations of potassium were significantly different between provinces, all samples were at or near Wilde's requirement for adequate tree growth. All of the samples, however, contained lower levels of magnesium than that needed to maintain satisfactory growth of the above-mentioned nutrient-demanding species (300 lbs/acre).

Besides these exceptions, the concentration of major essential elements and the percent organic matter appears to be ade-

¹Soil analysis was performed by the Soil Testing and Research Laboratory on the Fayetteville campus of the University of Arkansas.

Table 1. Comparison of average values for the major soil variables from samples taken within the area comprising the study populations of ginseng within each of four physiographic provinces in Arkansas

<i>Province</i>	<i>Texture Analysis</i>			<i>pH</i>	<i>%</i>	<i>(Nutrient Concentration (lbs/acre))</i>				
	<i>% Sand</i>	<i>% Silt</i>	<i>% Clay</i>			<i>Range</i>	<i>O.M.</i>	<i>P</i>	<i>K</i>	<i>Ca</i>
Crowley's Ridge	21.4	9.5	69.1	4.9-5.5	0.9	46.5	120.0	425.0	52.5	45.0
Boston Mtns.	39.0	14.4	46.6	4.6-5.4	1.2	11.8	142.5	1125.0	43.8	135.0
Springfield Plateau	34.3	19.2	46.5	6.7-6.8	2.2	13.5	60.0	1375.0	60.0	70.0
Central Ouachita Mountains	32.2	11.4	56.4	5.8-6.5	2.6	20.3	85.0	1600.0	71.7	81.7
All plots	33.1	13.2	53.7	4.6-6.8	1.7	20.7	107.7	1172.7	55.9	92.3

quate to support satisfactory tree growth, indicating that these study sites could be classified as having moderately fertile to fertile soils. The pH of the soil samples does not appear to be either too high or low to create any problems with nutrient availability or acid toxicity (Brady 1974).

The typical topographic location for these sample populations is difficult to define precisely. Generally, the populations were located on gentle to moderately steep midslope positions that were well-drained. These sites were either slightly concave to uniformly sloping and often were located just above midslope benches.

The average slope was 28.8 percent with a range from 2 to 50 percent. The typical aspect varied slightly between provinces. Two of the three Crowley's Ridge populations were found on southeastern exposures (135° - 160° azimuth) while the third was on a northwestern exposure (320°). All other plots fell within a range of azimuths from 6° to 60° ; northeastern exposures that should provide adequate protection from excessive solar radiation which has been demonstrated to be detrimental to ginseng growth in cultivated plots (Williams and Duke 1978, Jenkins 1980, Currie 1980).

DISCUSSION

The site factors presented in this survey of natural populations elucidate the complexity of defining a typical location where ginseng can be expected to occur. Ginseng is typically found on sites that are commonly called "rich woods." However, the definition of the typical rich woods site varies between the physiographic regions in Arkansas. Arkansas' varying topography with extremes of site conditions across relatively short distances creates a wide array of locations that appear to be suitable for ginseng growth. The natural populations examined in this study indicate that in general, ginseng is associated with clay soils that are well-drained, located on midslope positions with northeastern exposures, and that are of moderate to high fertility. The rich loessial soils of Crowley's Ridge modify the topographic variables that appear to reflect suitable site condi-

tions throughout the remainder of the range of ginseng in the state.

LITERATURE CITED

- ARKANSAS DEPT. OF PLANNING. 1974. Arkansas natural area plan. State of Arkansas, Little Rock, AR. 248 pp.
- BRADY, N. C. 1974. The nature and properties of soils. 8th Ed. Macmillan Publishing Co. New York, NY. 639 pp.
- CURRIE, D. J. 1980. Ginseng cultivation under artificial shade. In "Proceedings of second national ginseng conference." Jefferson City, MO. Missouri Dept. of Conservation. pp. 16-21.
- JENKINS, D. 1980. American ginseng cultivation under natural canopy. In "Proceedings of second national ginseng conference." Jefferson City, MO. Missouri Dept. of Conservation. pp. 11-15.
- LEWIS, W. H. 1980. American ginseng: a forest crop. Missouri Dept. of Conservation. Jefferson City, MO. 8 pp.
- WILDE, S. A. 1958. Forest soils. Ronald Press, New York, NY. 537 pp.
- WILLIAMS, L., and J. A. DUKE. 1978. Growing ginseng. U.S.D.A. Farmers' Bulletin No. 2201. Science and Education Administration. 8 pp.

SCHOOL OF FORESTRY
STEPHEN F. AUSTIN STATE UNIVERSITY
NACOGDOCHES, TEXAS 75962