

Public Abstract

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Title: An ecological study of American ginseng (*Panax quinquefolius* L.) in the Missouri Ozark Highlands: Effects of herbivory and harvest, ecological characterization and wild simulated cultivation.

American ginseng is a long-lived, increasingly rare and highly valued understory herb that has been harvested in North America for nearly 300 years. This study used eight years of data collected from six natural ginseng populations in east-central Missouri to examine life history characteristics, the effects of herbivory by white-tailed deer (*Odocoileus virginianus* Zimm.), and the effects of harvest on ginseng population dynamics. Most ginseng seedlings took longer than 7 years to mature, and projections indicate it may take 15 years for a seedling to produce enough seeds to replace itself. Annual harvest was found to be sustainable only if no more than 8% of the 3-leaf and 4-leaf plants are removed. If seed from harvested plants is sown at an appropriate depth (1") to improve germination success, up to 52% of the 3-leaf and 62% of the 4-leaf plants can be harvested annually.

Deer are more likely to browse larger reproductive plants than smaller plants. In the year following browse, plants were more likely to regress in size and produced fewer flowers. While the population growth rate was found to be growing during all of the years of the study, deer browse resulted in a significant decrease in the projected population growth rate.

This study also addressed the ecological requirements of ginseng in the Missouri Ozark Highlands. The 19 ginseng sites characterized exhibited few signs of recent disturbance (grazing, timber harvest, or land conversion), but ginseng harvest was likely in many of the sites, as indicated by the scarcity of plants even in sites known to formerly sustain larger colonies. There was a noticeable absence of 4-leaf plants in many of the sites.

Seed germination trials were conducted to determine the best depth at which to sow ginseng. Seeds sown on the soil surface germinated at the lowest rates and those sown between ½ and 1 ¼" germinated at the highest rates. The cultivation of "wild simulated ginseng" may ease harvest pressure on wild populations. Recommendations for choosing appropriate habitats for growing "wild simulated" ginseng and methods for sowing are presented based on the findings of these studies.