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

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ABSTRACT

Matrix population analysis was used to analyze eight years of demographic data from six American ginseng (*Panax quinquefolius* L.) populations in east-central Missouri to examine effects of herbivory by white-tailed deer (*Odocoileus virginianus* Zimm.), and root harvest. 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- and 4-leaf plants are removed. If seed from harvested plants is sown at 2 cm, up to 52% of the 3-leaf and 62% of the 4-leaf plants can be harvested annually.

Deer browse disproportionately affected reproductive stage classes. In the year following browse, plants were more likely to regress in stage class and produced fewer pedicels. While the projected 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 ("no herbivory" matrix $\lambda = 1.064$; ambient matrix $\lambda = 1.035$).

Nineteen natural ginseng sites were characterized. Stage distribution indicated that root harvest was likely to be occurring at many of the sites, even where prohibited. Seed germination trials found that seeds sown between 1 and 3 cm germinated at the highest rates.