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Characteristics of Deer Damage to Experimental Orchards in Ohio

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We measured several variables of newly established apple trees (1) to compare growth differences between trees damaged by browsing deer (Odooooileus t hemionus and trees protected from deer, (2) to determine if seasonal browsing patterns existed, and (3) to determine if deer browsed selectively among Ohio's 3 most commonly planted apple cultivars. All testing was die at the 0.05 alpha level. Experimental trees were measured repeatedly from June 1986 the May 1988.

Trees were planted in experimental orchards planted at research farms representative of areas where apples are groan commercially. Each experimental, orchard contained 20 tees each of 3 cultivars, red delicious, golden delicious, and red rune. Trees were planted randomly by cultivar pairs and arse tree of each pair was enclosed in a welded wire cylinder 1.5 m high to exclude deer. Eight orchards were planted the first year; 5 additional orchards were planted the second year. At the beginning of the second year half of the tree pairs in the 8 original orchards were randomly selected and the enclosures switched from the control to the treatment tree. Trees were measured mthly the first year, and bimonthly the' second year because the trees were much larger. Variables measured included branch length, number of leaves/branch number of leaves/can of branch length, and browsing frequency. Radial growth was determined by measuring trunk diameter at time of planting and each autumn thereafter.

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length of branches in all orchards but 3 were significantly reduced by browsing deer and browsed trees in all but 2 orchards had significantly reduced numbers of leaves. Browsed branches were observed in all but 1 orchard. The reduction in branch length ranged from 0% in the single undamaged orchard to 98% in one of the most serely browsed orchards; reduction in number of leaves/branch had a similar range from 0% to 85$.

Significant seasonal effects were found in branch length, number of leaves/branch, and browsing frequency between browsed and control trees. Two seasonal patterns existed among significantly browsed orchards. Browsing was concentrated either in early summer or autumn. Orchards with greatest branch and leaf reductions sustained significantly more browsing in early summer than any other season. Browsing in these orchards bean as soon as trees began to grow and teased only uher. trees failed to initiate new growth, became dormant, or died. Orchards with lower levels of browsing were damaged in late autumn and winter. Deer began to browse these orchards at the time leaves dropped from trees in adjacent wooded areas. leaves persisted oar apple trees longer than in surrounding forest trees. Sporadic browsing continued into winter in such orchards.

No evidence was found that deer selectively feed on any of the 3 cultivars tested. Browsing was severe enough to cause higher mortality among treated trees in 6 orchards ($p < 0.01$). Four orchards were moderately brow: mortality rates between browsed and unbrowsed trees were not different but radial growth was reduced significantly among browsed trees. Three orchards were browsed lightly, neither mortality rate nor radial growth was significantly different between browsed and unbrowsed trees.

After 2 growing seasons, most foliage was beyond the reach of deer. Browsing damage is most critical to small and immature trees. Growth rate and tree vigor are affected by edaphic conditicns, rootstock, and cultivar. Under editions of rapid growth, apple trees can outgrow the detrimental effects of deer browsing and protection might only be needed the first 2-3 years.