

Stenospermocarpic fruit linked to unmarketable black walnuts

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Black walnut (*Juglans nigra* L.) is native to much of the eastern United States and is highly valued for its nuts and timber. Black walnut fruit generally reach most of their size by mid-August and mature by late September or early October. The fruit are then harvested, hulled, and dried in-shell before cracking for commercial markets. Walnut growers use the term "ambers" to describe poorly filled, shriveled eastern black walnut kernels. These "ambered kernels" are not marketable, resulting in economic loss to commercial growers. Although researchers have identified the symptoms of ambered kernels, there is limited information available to growers about the cause of this problem.

A study published in *HortScience*, authored by Michele Warmund from the University of Missouri and J.W. Van Sambeek of the USDA Forest Service, evaluated the incidence of ambered kernels in fruit of [black walnut trees](#). The study was also designed to determine when symptoms of ambered kernels first appear during the [growing season](#), and to identify which fruit tissues are associated with ambers.

Warmund and Van Sambeek selected five 'Football' black walnut trees at three different sites in a commercial orchard near Windsor, Missouri. The trees were similar in age (32 years), size, and cropload. Fruit were harvested from trees on 3 days in October over 3 consecutive years. Immediately after harvest, fruit from each tree were hulled and cleaned, then stored at 4°C for 1 week before being evaluated. One hundred walnuts per tree were randomly sampled and inspected for the presence or absence of ambered kernels.

Analyses showed that 'Football' black walnut fruit numbers per tree were similar among all sites when averaged across three years of the study.

"Despite their different soil water-holding capacities, non-irrigated trees produced similar fruit numbers over a 3-year period," Warmund and Sambeek wrote. "However, we found that mean fruit numbers varied by location and year, indicating that other factors influenced fruit yields."

The researchers concluded that stenospermocarpy—the development of fruit that contain aborted or rudimentary embryos after fertilization—occurred in developing 'Football' black walnut fruit. They observed aborted or small degenerated embryos in stenospermocarpic black walnut by early July, and then at subsequent sampling dates throughout the growing season. "During the growing season, stenospermocarpic fruit enlarged and contained incompletely or non-filled kernels with shriveled, dark brown or black-colored pellicles," said the authors. "Stenospermocarpic fruit also had slightly smaller nut diameters than those with filled kernels and light-colored pellicles at harvest."

The researchers concluded that visible embryo degeneration, which was associated with ambered [kernels](#) in black walnut [fruit](#), was detected when shell hardening occurs and kernel tissues are enlarging, and are not often apparent without cracking to expose the kernel.

More information: The complete study and abstract are available on the ASHS HortScience electronic journal web site:

hortsci.ashspublications.org/c ... t/49/9/1142.abstract

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