

BEYOND VASCULAR TISSUE: TACTICS FOR FEEDING ON PARENCHYMA, EPIDERMIS, AND REPRODUCTIVE STRUCTURES OF PLANTS

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Electrical penetration graph techniques have been extensively used to analyze probing to phloem sieve tubes and xylem vessels, but only recently has this procedure been adapted for use with Heteroptera and other piercing-sucking feeders that exploit ground, dermal, and meristematic tissues. Damage to these tissues may result in chlorotic lesions, stunting or necrosis of new growth, fruit deformities, cone abortion, seed losses, and pathogen transmission. Ingestion may occur from a variety of cell types, including spongy and palisade mesophyll, phloem parenchyma, root storage parenchyma, pericarp, embryo, endosperm, and nucellar tissue. As we increase our understanding of these diverse feeding behaviors, the traditional distinctions between “sheath feeders” and “lacerate (or macerate)-and-flush” feeders may be blurred, and guild concepts of xylem, phloem, and mesophyll feeding modes need to be expanded. Emergence of pentatomids as serious pests of soybean and genetically engineered cotton worldwide has spurred greater interest in EPG analysis of probing and plant damage by pentatomomorph true bugs. Research with green vegetable bugs, *Nezara viridula* (L.) (Pentatomidae) and leaf-footed bugs, *Leptoglossus phyllopus* (L.) (Coreidae), using an AC-DC four-channel universal EPG monitor, has elucidated distinct waveform types associated with stink bug pod and stem feeding. Coreid waveform patterns on legume pods are more varied than those of the pentatomids. Measurements of probe duration and frequency in leaf-footed bugs have revealed differences among developmental stages; adults probe more frequently than large nymphs (3rd – 5th instar), locate the ingestion target tissue faster, and probe for a longer total period of time; time until first probe is also significantly shorter for adults than large nymphs. Correlation of waveform patterns with feeding behaviors is currently planned or in progress in other labs for a number of heteropteran pest species, including squash bug, *Anasa tristis* (De Geer); redbanded stink bug, *Piezodorus guildinii* (Westwood), brown stink bug, *Euschistus servus* (Say), and Southern chinch bug, *Blissus insularis* Barber.

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