

Root feeding insects - an ecosystem perspective

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Research on plants and their insect herbivores has traditionally been dominated by studies looking at interactions occurring aboveground and the mechanisms and processes underpinning herbivory have been explored in almost all terrestrial ecosystems. By comparison, belowground insect herbivores have been less well studied. Given that there is ample evidence from diverse ecosystems that more than 50% of net primary productivity is frequently allocated to the roots, which can approach 90% in some cases, this seems to be paradoxical at first sight. However, there is little doubt that root herbivores can be of considerable importance within an ecosystem. For example, root-xylem feeding cicadas in deciduous forests of North America have the highest collective biomass of any terrestrial animal when considered in terms of biomass per unit area. The realisation that root feeders play key roles in many ecosystem processes has undoubtedly invigorated interest in root herbivores. This talk will address the latest approaches to studying root feeding insects, and in particular, the use of X-ray tomography to non-invasively study soil-dwelling insects *in situ*. This approach has been used to demonstrate how the clover root weevil (*Sitona lepidus*) locates root nodules on its host plant using a combination of general (e.g. carbon dioxide) and specific (e.g. isoflavonoids) chemical cues. Some of the effects of root feeding insects on organisms living aboveground are well known, but only recently has the subject area being approached with meta-analysis. General trends will be considered, in addition to specific examples of intra-specific conflicts and facilitation between parental insects living aboveground and their root-feeding offspring.

