

FEEDING BY *KAHAONO* LEAFHOPPERS IN SILKEN SHELTERS (HEMIPTERA: CICADELLIDAE: TYPHLOCYBINAЕ: DIKRANEURINI)

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Abstract

Adults and nymphs of the leafhopper *Kahaono montana* Evans have been observed feeding beneath a silken web or tent attached to the host leaf. Feeding by the leafhoppers is confined to the limits of the tent. Beads of liquid excrement catch on the tent to form a layer that may provide camouflage over the feeding insects. Possible benefits of this feeding behaviour are discussed.

Introduction

Cicadellid leafhoppers of the subfamily Typhlocybinae are parenchyma feeders and feed almost exclusively on the epidermal cells of leaves. Of the six typhlocybinae tribes, four are known to occur in Australia (Fletcher and Larivière 2001). The tribe Dikraneurini is represented in Australia by four genera, three of which are endemic and exclusively restricted to host plants in the genus *Eucalyptus* (Myrtaceae). *Aneono* Kirkaldy, *Kahaono* Kirkaldy and *Dziwneono* Dworakowska are all flattened dorsoventrally and adapted to fit closely to the vertical leaves typical of plants in this genus. Many of the species in these genera are brightly coloured with red and green being common.

Observations

In July and August 1987, individuals of *Kahaono montana* Evans (Fig. 1) were found at Seven Hills, in the western suburbs of Sydney, feeding under circular structures or tents made of fine silken webbing fastened to the leaf around the perimeter of the structure. The host tree was an unidentified species of *Eucalyptus*. This observation was first reported by Day and Fletcher (1994), who provided little detail. Adults and nymphs, as well as cast skins, were found under the web and feeding damage caused by the leafhoppers was restricted to the area of the leaf covered by the tent (Fig. 2). The tent was decorated by small globules of excrement presumably ejected by the leafhoppers as they fed and these turned black through the growth of sooty moulds (visible in Fig. 1). In some cases, the amount of excrement on the web was sufficient for the globules to run together to form a continuous covering over the leafhoppers (Fig. 4).

In February 2001, further observations of the same species of leafhopper, feeding under similar structures, were made at two State Forests of NSW eucalyptus plantations on the north coast of New South Wales. At the first plantation, located near Dorrigo, the species was feeding on 3 year old *Eucalyptus dunnii* Maiden, while at the second plantation, near Urbenville,

the host species was *E. grandis* Hill ex Maiden. Feeding damage by the leafhoppers was again restricted to the leaf area covered by the tents, which were always found on the abaxial surface of the leaf. The damage symptoms were observed as chlorotic patches which then darkened to a reddish hue as feeding continued. In all cases, globules of excrement, discoloured to black, were caught in the webbing. A tent from the Dorrigo population is shown in Fig. 3. The number of trees affected by the leafhopper was small and damage was restricted to isolated patches within the plantations.

Discussion

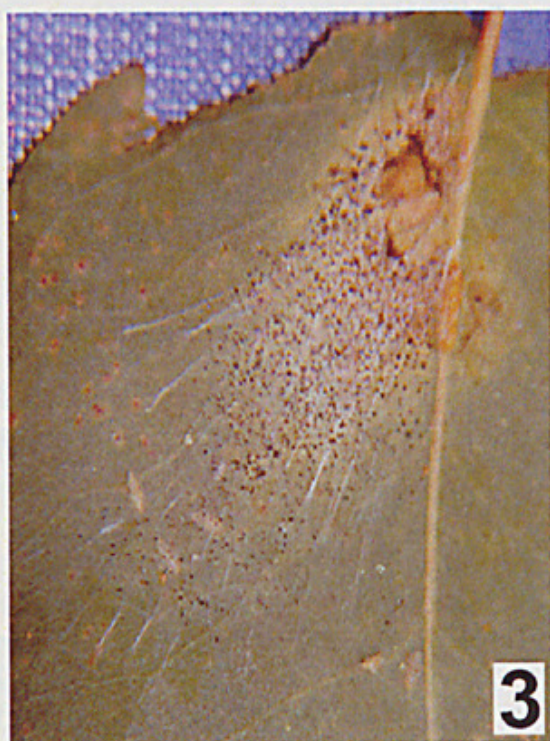
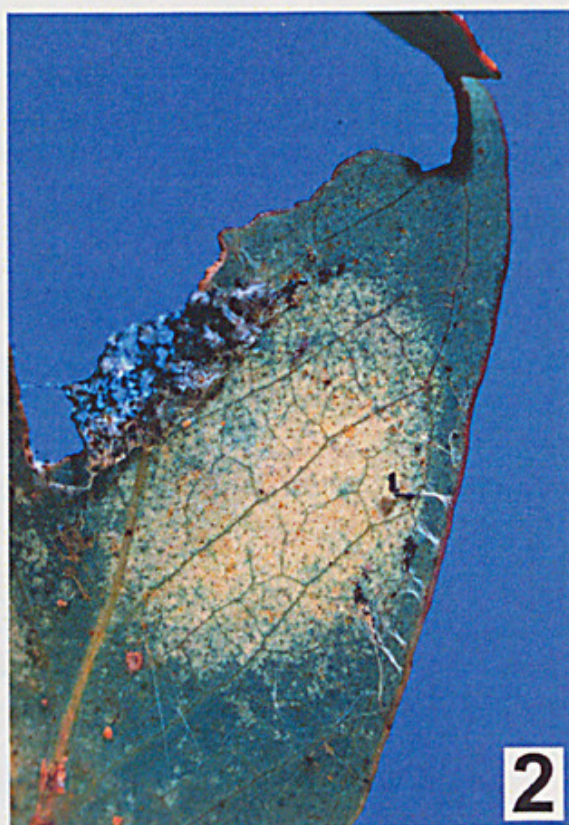
This behaviour has not been observed in other species of leafhoppers. Even other species of *Kahaono* appear to have more typical feeding behaviour. In March 1997, large numbers of *K. wallacei* Evans were found feeding on eucalypt leaves in Orange Botanic Gardens (Fletcher, unpubl. obs.). The large numbers of leafhoppers caused sufficient discolouration of both surfaces of the leaves to change the appearance of the tree dramatically but no evidence of tents was observed on the damaged leaves. The feeding insects were distributed generally over the abaxial leaf surface and resulting feeding damage was not restricted in the manner shown for *K. montana* in Fig. 2.

It is unknown whether the tent is produced by the leafhoppers themselves or is a product of some other organism which has been utilised by the leafhoppers. However, observations of a number of tents showed that the only inhabitants were leafhoppers. This contrasts with the observation by Bourgoïn and Wilson (1992) of a planthopper, *Myndus chazeauxi* Bourgoïn & Wilson (Hemiptera: Cixiidae), sheltering during the day in silken shelters in leaflet hollows of palm fronds that were shared with the clubionid spiders that had created the shelters. Other hemipteran groups use protective structures to cover the feeding nymphs and, in some cases, adults. The lerps produced by many Psyllidae are secreted by the nymphs for their protection and many coccoids also produce a protective covering. However, these coverings are waxy or chitinous in substance, whereas the tents of *K. montana* are clearly silken and similar in texture to fine spiderweb.

It is important to note that the same species has been observed feeding under such a structure on two separate occasions, 14 years apart, in three quite distinct localities, while other species of the same genus have not been associated with such behaviour. Since the feeding of the leafhoppers is clearly restricted to the area under the tent only (Fig. 2), there is a definite association between the leafhopper and the tent. Possible benefits of feeding under such a structure could include camouflage, protection from parasites and predators or protection from dehydration.

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Figs 1-4. *Kahaono montana* leafhoppers and feeding tents. (1) Adult female (left) and male feeding under globules of blackened excrement suspended on the tent; (2) Leaf with tent folded back (to top left) to reveal feeding damage. Anchor points from the tent can be seen to the right of the feeding area; (3) Leaf of *Eucalyptus dunnii* near Dorrigo with webbing tent covering nymphs; (4) Tent on gumleaf with continuous covering of excremental material.

The photographs were taken by Lowan Turton (NSW Agriculture) [Figs 1, 2, 4] and Angus Carnegie (State Forests of NSW) [Fig. 3]. Helpful comments on the manuscript were provided by Angus Carnegie and John Macdonald (NSW Agriculture).

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