

Hakea trifurcata (Proteaceae): The two-leaf Hakea

Hakea trifurcata (Proteaceae), an endemic to south-western Australia, known locally as the Two-Leaf Hakea, displays a unique form of leaf dimorphism, producing broad and terete leaves on the same branch.

Broad leaves are only produced once a plant reaches reproductive maturity, and are only formed during late winter to early spring. Later in the season (late spring) only terete leaves are produced.

Another unusual feature of this species is that the broad leaves are similar in appearance to the woody fruits (follicles) in terms of shape and colour. Broad leaves may act as a visual deterrent to granivores, where the broad leaves are perceived as fruits.

This article examines the adaptive significance of possessing co-occurring broad and terete leaves, in particular whether the presence of broad leaves makes the follicles less visible to potential granivores.

Foraging by an avian granivore

To test the effectiveness of broad leaves in deterring potential granivores, foraging trials were conducted at a local zoo using a known avian granivore – Carnaby's Cockatoo (*Calyptorhynchus funereus latirostris*).

One at a time, fruit-bearing branches were placed into a cage containing two cockatoos, some with all the broad leaves removed (treated), others with the broad leaves retained (control). Observations were made on the number and type of plant part approached or removed by the birds over a 30 minute period. The total number of fruit presented to the birds was the same between treatments.

There was a marked decrease in the number of follicles and broad leaves approached by the cockatoos as the trial proceeded.

The total number of follicles removed from branches lacking broad leaves was significantly higher than the control



Self-Crypsis

Hakea trifurcata deploys an unusual example of imperfect self-mimicry with the broad leaves superficially resembling and shielding the green follicles.

Trials with a known avian granivore suggests that the birds were treating the mass of broad leaves as a background of potentially unrewarding information.

Humans also have problems detecting the fruits from among the leaves (60% easily visible¹). Even when the broad leaves were removed only 85% of the woody fruits were detected. This type of cryptic mimicry is known as 'self-crypsis', and is known to occur within other *Hakea* species (e.g. *H. prostrata*, *H. amplexicaulis*).

The sharply pointed, and highly sclerophyllous terete leaves provide a physical deterrent to potential granivores.

These leaves are more water-conservative than co-occurring broad leaves² and are the only leaf type produced during the drought-prone seedling and juvenile stages. For most

populations broad leaves represent <40% of the canopy and are only produced on flowering plants.



Can you spot the woody fruit in the above photograph?

¹Groom et al. (1994) *Functional Ecology* 8, 110-117.
²Groom et al. (1994) *Aust J Botany* 42, 307-320.

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