Mammal Notes
Short research communications from The Mammal Society Autumn 2009

How do badgers eat yew 'berries' without being poisoned?

Peter Gasson, John Lees and Geoffrey Kite

Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB.

Corresponding author: P.Gasson@kew.org

Introduction

Badgers are opportunistic omnivores with a very broad diet. They are increasingly common at the Royal Botanic Gardens, Kew, having originated in Richmond Park and entered the gardens in the early 1980s at the southern end. Neal (1948) mentions "one reported at Kew recently", so there appears to have been an absence of nearly 40 years. Badgers have since inhabited most of the gardens with at least 24 'setts' reported by 2005 (Martin 2005).

Two almost adjoining setts, which have expanded in the last few years, are between the Jodrell Laboratory and Orangery. Most of the surrounding vegetation consists of exotic shrubs and grass, but there are several large yew trees (*Taxus baccata*) which fruit profusely. Badgers are very active in this area and can be watched in the autumn eating yew 'berries' from the paths (Fig. 1) and standing on their hind legs to reach the 'berries' on the trees.

Fig. 1 Badger eating yew berries on the path at Kew.

Yew fruits are not strictly berries, but a naked seed sitting on a fleshy, sweet, red-coloured mucilaginous appendage called an aril. Yew is one of Britain's most poisonous plants, but many animals, including badgers (e.g. Neal & Cheeseman 1996; Thomas & Polwart 2003), are known to eat the fruits. The leaves and seeds of yew contain toxic taxine alkaloids, and horses and other livestock are frequently poisoned by eating yew leaves. However, taxine alkaloids are not present in the red arils. Our observations on the Kew badgers indicated that they were eating the entire fruits and these were passing through the badger's system, as evidenced by dung pits full of faeces containing the remains of yew arils with intact seeds within a few metres of the yew trees and setts (Fig. 2).

Fig. 2 Badger dung pit full of partially digested yew 'berries'.

We took this opportunity to compare the alkaloids in the seeds from fruits on the tree and from seeds that had passed through a badger.

Methods

An analytical method using liquid chromatography-mass spectrometry (LC-MS) has been developed by Kite *et al.* (2000) to detect taxine alkaloids. Seeds from fruits picked from the yew tree and badger faeces were ground in methanol in a pestle and mortar and left to extract overnight. The extracts were clarified by centrifugation and adjusted to the same concentration (so that 1 ml of extract contained the compounds extracted from 50 mg of seed) then analysed by LC-MS. The arils of the fruits from the tree were also extracted and analysed in the same way.

Results

The abundances of the chemicals extracted are shown on the traces (Fig. 3). It is clear that the concentration of the main alkaloid in the extract of seeds before (ingestion) and after (ingestion) is similar, as are the concentrations of taxine B-type alkaloids, although there were some differences in the abundances of other alkaloids. No alkaloids were detected in the arils, which are universally accepted as being non-poisonous. The results indicate that there is no major loss of alkaloids from the seeds as they pass through the badger's gut.

Discussion

Although we do not have any replication, do not know how many badgers (possibly only one!) have contributed to this experiment and cannot be absolutely certain that the fruits came from the tree sampled, this opportunistic observation does suggest that badgers can eat yew 'berries' with impunity, with most of the toxic alkaloids being retained in each unbroken seed surrounded by its mucilaginous aril as it passes rapidly through the gut.

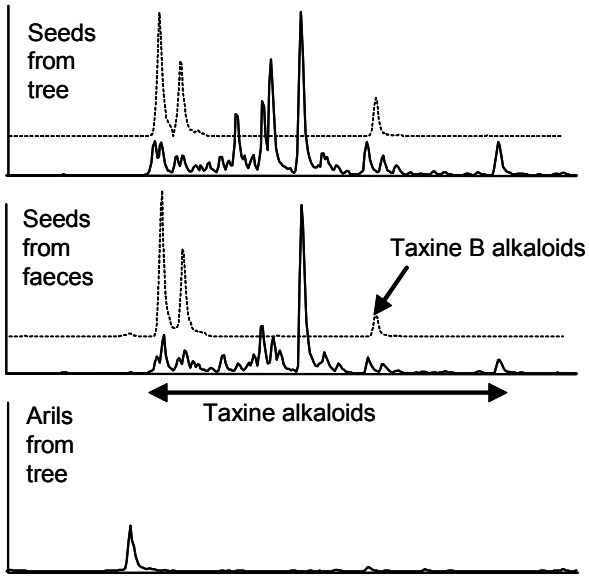

Fig. 3. LC-MS (liquid chromatography-mass spectrometry) traces comparing the chemicals present in the yew seeds before and after passing through the badger, and yew arils. Solid lines are all compounds detected (most peaks in the seed traces within the range indicated, including the biggest, are taxine alkaloids); broken lines are specifically taxine B-type alkaloids. All samples were analysed at the same concentration.

References

Kite, G.C., Lawrence, T.J. & Dauncey, E.A. 2000. Detecting *Taxus* poisoning in horses using Liquid Chromatography/Mass Spectrometry. Veterinary and Human Toxicology 42(3): 151-154.

Martin, F. 2005. Badger survey, RBG Kew, May to July 2005.

Neal, E. 1948. The Badger. New Naturalist Monograph. Collins, London.

Neal, E. & Cheeseman, C. 1996. Badgers. T. & A.D. Poyser.

Thomas, P.A. & Polwart, A. 2003. Biological Flora of the British Isles No. 229: *Taxus baccata* L. Journal of Ecology 91: 489-524.