Scientists investigate occurrence of alkaloids in the heartwood of Taxus baccata (European yew)

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Taxus baccata. Credit: G. Kite

Taxus baccata (European yew) is a well known poisonous plant. Eating a relatively small quantity of leaves can be fatal for livestock and humans. The toxicity of yew leaves is due to the presence of alkaloids known as taxines, of which taxine B is suspected as being one of the most poisonous. Taxines are also known to be present in the bark and seeds of yew, but are absent from the fleshy red arils.

The occurrence of taxines in leaves, seeds and bark of yew is often summarised in books and on the internet as 'all parts' of yew are poisonous, except for the arils. This has created confusion about whether the wood of yew is also hazardous.

Those searching for evidence of yew wood toxicity will no doubt find reference to the observations of the Roman naturalist and philosopher Pliny the Elder who, in his Natural History (AD 77-79), noted that 'even wine flasks for travellers made of its wood in Gaul are known to have caused death.' In the modern scientific literature, however, evidence for yew wood causing health problems is limited to a few cases of irritation or dermatitis.

When chemists at Kew examined the scientific literature on yew wood chemistry, they found that reports on taxines, particularly taxine B, in heartwood of yew were also ambiguous. Statements were not supported by reference to original research demonstrating the presence of taxines, although some general and non-specific tests for alkaloids had been performed.

Goblet made from yew wood from Kew's Economic Botany Collection. Credit: G. Kite

At Kew, a sensitive method for detecting taxine B had previously been developed to assist with livestock poisoning enquiries. The method involved making an extract of the test material in methanol and analysing this by liquid chromatography-mass spectrometry (LC-MS), a technique that is able to detect trace amounts of a specific compound in a chemically complex solution. When the Kew chemists applied the method to yew heartwood, they were unable to detect taxine B.

Numerous taxine alkaloids in addition to taxine B have been reported in the leaves of yew, and the main taxine in the bark is different to that in the leaves. Sill more taxines have been found in other species of Taxus.

Thus, to broaden the search for taxines, the Kew chemists devised a LC-MS method to detect taxine alkaloids generally, not just taxine B.

The method was published recently in the *Journal of Chromatography B* and compliments the taxine B-specific method when investigating livestock poisoning incidents. When the new method was applied to yew heartwood it revealed an array of taxine alkaloids (including the major alkaloid in the bark), although the concentration of alkaloids was low compared to the leaves or bark.

The toxicity of the taxine alkaloids detected in yew heartwood is not known. However, as the Kew chemists readily detected taxine contamination in wine into which yew wood had been placed, it would seem sensible to caution against testing Pliny's observation and not drink wine from a yew wood utensil.

More information: Kite, G. et al. (2013). Generic detection of basic taxoids in wood of European Yew (Taxus baccata) by liquid chromatography–ion trap mass spectrometry, *Journal of Chromatography B* 915-916: 21-27.

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