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Analyses of Black Wattle *(Acacia mearnsii)* Tannins – Relationships Among the Hide-Powder, the Stiasny and the Ultra-Violet (UV) Methods

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Summary

With a view to seeking an alternative for the laborious and time-consuming hide-powder method for tannin analysis, eighteen samples of black wattle tannin extracts, which had been analysed previously by both the Stiasny and the hide-powder methods, were analysed by a very simple ultra-violet (UV) method. Statistical analysis revealed that there were significant relationships between results from the hide-powder, the Stiasny and the UV methods. Considering that tannin contents by the hide-powder method are functions of both UV and total solids, and the Stiasny values are a function of UV, two regression equations have been obtained. The first predicts tannin content as measured by total solids from the hide-powder method and UV absorptivity. The second predicts Stiasny values from UV absorptivity. Thus, the UV method can be used to estimate approximate values of tannin content and Stiasny values, and may be particularly useful in silvicultural studies relating to selection or screening of high tannin content progenies and/or provenances, where large numbers of tannin analyses are required.

Introduction

The bark from black wattle (*Acacia mearnsii* De Wild) contains water soluble components, known as "wattle tannins", which are an important source of tannins for leather tanning, water-proof wood adhesives and other uses. The wattle tannins have been commercially produced mostly in South Africa and Brazil.

In 1985, the Australian Centre for International Agricultural Research (ACIAR) collaborated with the Chinese Academy of Forestry on research into "Wattle silviculture and the utilization of tannin extracts" and this project has been extended to "Wattle silviculture and pulping studies" since 1989. The Chinese Academy of Forestry, Research Institute of Chemical Processing and Utilization of Forest Products, Nanjing has been involved in research on analysis of tannins and utilization of tannins as wood adhesives. Development of a rapid and reliable method for tannin analysis is vitally important for the ACIAR Project on wattle silviculture in China where new generic resources of black wattle have been introduced from Australia through the establishment of provenance trials and seedlings and orchards/progeny trials.

The Stiasny method (Yazaki and Hillis 1977) is regarded as a rapid method for evaluating extracts for wood adhesives, while the hide-powder method is used in tannin analysis for leather tanning (Anon. 1965) and is both laborious and time consuming. Yazaki *et al.* (1990) reported on the results of black wattle bark samples collected from 20 provenances in Australia which were analysed by the Stiasny method. Later, the tannin contents of the bark samples were analysed by the hide-powder method with a view to seeking a possible replacement to the hide-powder method with the rapid Stiasny method. However, it has been found that the Stiasny values cannot make a good prediction of tannin contents for the treatment of leather (Zheng *et al.* 1992).

Based on the fact that the major components of wattle tannins are polyflavanoids which show strong absorption in the ultra-violet region 250–280 nm, Roux (1951) developed a simple and rapid UV method for tannin analysis.

In this study, the UV method was used to determine tannin contents of hot water extracts which had been analysed previously by the Stiasny and hide-powder methods. Furthermore, the relationships among the results obtained by these three methods were studied with a desire to replace the hide-powder and the Stiasny methods with the UV method.

Materials and Methods

Sample preparation of black wattle tannins

The bark samples of black wattle (*Acacia mearnsii* De Wild) were