

The chemistry of Brazilian Leguminosae. LX. Indolylacetic acid from *Tachigalia paniculata*

Silvia M. C. Dias; (1) José G. S. Maia; (2) Zenaide S. Ferreira (3) e Otto R. Gottlieb (3)

Abstract

The ethanolic extract of trunk wood of *Tachigalia paniculata* Ducke (Leguminosae-Caesalpinioideae) was found to contain substantial quantities of 2-(3-indolyl)-acetic acid.

INTRODUCTION

Tachigalia Aubl., a small genus of the tribe Caesalpinieae, subfamily Leguminosae-Caesalpinioideae, comprises 24 species which occur in tropical Central and South America, mostly in Amazonia (Polhill & Vidal, 1981). The sole chemical registry on the genus refers to *T. paniculata* Ducke, the inflorescences of which were reported to contain tryptamine and N-methyltryptamine (Svoboda *et al.*, 1979). In continuation of our work on the chemistry of Leguminosae (for Part LIX see Braz Filho *et al.*, 1980), a trunk wood sample, collected from a *T. paniculata* tree of the Ducke Forest Reserve near Manaus, was examined. To our surprise we were able to isolate from the ethanol extract, besides the common plant extractive sitosterol, only 2-(3-indolyl)-acetic acid.

EXPERIMENTAL

Isolation of the constituents. Trunk wood of *Tachigalia paniculata* was reduced to powder (5 kg) and percolated with ethanol. The solvent was evaporated and the residue (15 g) was extracted in a soxhlet apparatus successively with benzene and ethyl acetate. Both solutions were evaporated. The residue (9 g) of the benzene extraction was chromatographed on a column of silica gel (200 g). Elution with benzene, benzene — ethyl acetate 8:2 and

ethyl acetate gave respectively aliphatic esters, sitosterol and indolylacetic acid. The residue (3.6 g) of the ethyl acetate extraction was chromatographed on a column of silica gel (110 g). Elution with chloroform and benzene — ethyl acetate 8:2 gave respectively sitosterol and indolylacetic acid. Totals obtained: aliphatic esters 3 g, sitosterol 1.5 g, indolylacetic acid 100 mg (20 ppm, calculated on wood).

2-(3-Indolyl)-acetic acid, crystals, lit. mp (Merck Index, 1976) and mp 168-170° (benzene — ethyl acetate). UV (Sadtlter UV n° 223), IR (Sadtlter IR n° 670), ¹H NMR (Sadtlter NMR 1198) and mass (Jamieson & Hutzinger, (1970) spectra superimposable on analogous spectra given in the literature.

DISCUSSION

Indolylacetic acid (heteroauxin) is a plant growth hormone which controls growth by promotion of cell elongation at the growing tip. Even stems, branches and trunks of woody plants, however, may be major sites of auxin synthesis, although they are rarely mentioned in standard accounts of the subject (Little *et al.*, 1978; Odani, 1970; Sheldrake, 1971; Sheldrake & Northcote, 1968). While there is thus little doubt that the compound is widely distributed in plant tissue, it is equally clear that, being a hormone, relatively small quantities (a few µg/kg) are highly efficient (van Overbeck, 1966; Galston & Davies, 1969; Galston & Purvæs, 1960). This, added to the fact that it occurs in plants in different combined forms (Bandurski & Schulze, 1977; Harborne, 1971) explains why it has so far been isolated only infrequently in normal phytochemical work.

(1) — Secretaria de Agricultura e Abastecimento do Estado de São Paulo, São Paulo, SP.

(2) — Instituto Nacional de Pesquisas da Amazônia, Manaus, AM.

(3) — Universidade de São Paulo, São Paulo, SP.

The unusual finding of mg/kg quantities of indolylacetic acid in *T. paniculata* could *a priori* be due to artifact formation. Indeed, the compound can be produced during extraction of plant material either by hydrolysis of combined forms (Brenner, 1981), or by enzymatic (Whitemore and Zahner, 1964) or spontaneous (Shantz, 1966) oxidation of tryptophan; and, as already stated above, *T. paniculata* is rich in tryptophan derived amines. Alternatively, epiphytic bacteria or fungi may introduce exogenous auxin into cellular tissue (Libbert *et al.*, 1966; Pegg, 1976). This latter phenomenon is the most attractive rationalization of the present case. We have reported previously that wood samples, void of substantial quantities of autochthonous secondary metabolites, may contain a considerable gamut of fungal metabolites (Alvarenga *et al.*, 1978). Thus also in *T. paniculata* the quantity of secondary metabolites may be too small for efficient defense against infestation by indolylacetic acid producing microorganisms.

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RESUMO

Do extrato etanólico da madeira de tronco de *Tachigalia paniculata* Ducke (Leguminosae-Caesalpinioideae) foram isoladas quantidades substanciais de ácido 2-(3-indolil)-acético.

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