

Purine Alkaloid Catabolism Pathways in *Coffea arabica* Leaves

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SUMMARY

In a study of purine alkaloid catabolism pathways in coffee, ¹⁴C-labelled theobromine, caffeine, theophylline and xanthine were incubated with leaves of *C. arabica*. Incorporation of label into ¹⁴CO₂ was determined and methanol-soluble metabolites were analysed by HPLC-RC. The data obtained demonstrate catabolism of caffeine → theophylline → 3-methylxanthine → xanthine. Xanthine is degraded further by the conventional purine catabolism pathway to CO₂ and NH₃ via uric acid, allantoin and allantonic acid. The conversion of caffeine to theophylline is the rate limiting step in purine alkaloid catabolism and provides a ready explanation the high concentrations of endogenous caffeine that are found in *C. arabica* leaves. Although theobromine is converted primarily to caffeine, a small portion of the theobromine pool appears to be degraded to xanthine by a caffeine-independent pathway. In addition to being broken down to CO₂, via the purine catabolism pathway, xanthine is metabolised to 7-methylxanthine. Metabolism of [2-¹⁴C] xanthine by *C. arabica* leaves in the presence of 5 mM allopurinol results in very large increases in incorporation of radioactivity into 7-methylxanthine as degradation of the substrate via the purine catabolism pathway is blocked. The identity of 7-methylxanthine in these studies was confirmed by GC-MS.