

Updated Review of Purine and Purine Alkaloid Metabolism in *Coffea* and *Camellia* Plants

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SUMMARY

The metabolism of purine nucleotides and purine alkaloids (e.g. caffeine theobromine and theophylline) are inherently woven together in coffee and tea plants. Purine metabolism in these plants is similar to that in others which do not contain caffeine; however, coffee and tea plants have purine nucleotides, including those produced directly by the pathway of purine biosynthesis *de novo* which serve as effective precursors of caffeine. Xanthosine is the first methyl acceptor from *S*-adenosylmethionine in caffeine biosynthesis, and is also metabolized by a purine degradation pathway via xanthine. The regulation of purine alkaloid biosynthesis remains elusive, but the activity of the three *N*-methyltransferases, IMP dehydrogenase, and *N*-methylnucleosidase are considered as well as the caffeine degradation route. The production and accumulation of the alkaloids are associated with the developmental stage of tissues (i.e. leaves, flowers, fruits and seeds) and with seasonal changes. In *Coffea* plants and in cultured cells, the rate of caffeine synthesis and turnover (i.e. biodegradation and or biotransformation to xanthine or to methyluric acids) differs markedly among species. The metabolism (especially biosynthesis) of purine alkaloids differs among *Camellia* species. Ecological roles of the alkaloids have been reported, but their physiological significance in tea and coffee plants remains uncertain.