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Volume 48, Issue 1, 7 January 2019, Pages 9-19Analysis of bioactive pigments in coloured callus of *Azadirachta indica* for possible use as functional natural colourants (Article)Ashokhan, S.<sup>a</sup> [✉](#), Ramasamy, S.<sup>a</sup> [✉](#), Karsani, S.A.<sup>a</sup> [✉](#), Othman, R.<sup>b</sup> [✉](#), Yaacob, J.S.<sup>c,d</sup> [✉](#) [👤](#)<sup>a</sup>Institute of Biological Sciences, University of Malaya, Kuala Lumpur, Malaysia<sup>b</sup>Department of Landscape Architecture, International Islamic University Malaysia, Kuala Lumpur, Malaysia<sup>c</sup>Institute of Biological Sciences, University of Malaya, Kuala Lumpur, Malaysia[View additional affiliations](#) [v](#)

## Abstract

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**Purpose:** The purpose of this study is to evaluate the content of bioactive pigments in coloured callus of *Azadirachta indica* and to understand the correlation between the callus colours with their bioactive constituents, antioxidant properties and cytotoxicity. These assessments will yield valuable insight into the use of in vitro-derived pigments for possible use as functional natural colourants. **Design/methodology/approach:** In this study, the authors have successfully developed a protocol to produce leaf-derived callus of various colours with enhanced content of bioactive pigments in *A. indica* through plant tissue culture. Comparative analysis of the pigments content (chlorophyll, carotenoid, phenolics and anthocyanins) in the coloured callus was conducted, followed by evaluation of its bioactive properties. The antioxidant properties against 2,2-diphenyl-1-picrylhydrazyl and 2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonic acid) radicals, ferric reducing antioxidant power and cytotox activities of the coloured callus extracts were also reported. **Findings:** Callus of various colours were successfully produced in *A. indica* through plant tissue culture, and their valuable pigment content and bioactivity were evaluated. The green callus contained the highest amount of anthocyanin, followed by brown and cream callus. The total anthocyanin contents in both the green and brown callus was more than two-fold higher than that in cream callus. Contrasting observation was obtained for total phenolic content (TPC), where the TPC of cream callus was significantly higher than that in brown callus. Nevertheless, the green callus also exhibited the highest TPC. Green callus also contained the highest amount of total chlorophyll and carotenoid, as well as exhibited the highest antioxidant potential, and was found to be the only extract with active cytotox activity against SKOV-3 cells. Correlation analysis revealed that the excellent bioactivity exhibited by the coloured extracts was strongly correlated with the bioactive pigments present in the callus. **Research limitations/implications:** The major bioactive compounds identified in the methanolic extracts of *A. indica* coloured callus are anthocyanins, phenolics, chlorophylls and carotenoids. Future research work should include improvements in the extraction and identification methods, which may lead to detection and determination of other compounds that could attribute to its bioactivity, to complement the findings of the current study. **Practical implications:** This analysis provides valuable information on the application of plant tissue culture as an alternative source for sustainable production of major pigments with medicinal benefits in *A. indica* for possible use as functional natural colourants. **Originality/value:** A comparative study on bioactive pigment production in coloured callus from *A. indica* leaves and its antioxidant potential and cytotoxicity is original. To the best of the authors' knowledge, this is the first report detailing a comparative evaluation on the production of coloured callus in *A. indica* and its relative biochemical composition and bioactive properties. © 2018, Emerald Publishing Limited.

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24-Dichlorophenoxyacetic acid Azadirachta indica Bioactive pigments Coloured callus Functional colourant Thiadiazuron

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