Category: Nanotechnology

Over-expression of the splice variant of CONSTANS enhances the in vitro synthesis of silver nanoparticles

Abhishek Kumar and Kishore C.S. Panigrahi

School of Biological Sciences, National Institute of Science Education and Research (NISER)-Bhubaneswar, Jatni, Odisha, 752050, INDIA
Homi Bhabha National Institute, Training School Complex, Anushakti Nagar, Mumbai 400094, INDIA

Abstract

Eco-friendly biosynthetic approach for silver nanoparticles production using plant extracts is an exciting advancement in bio-nanotechnology and has been successfully attempted in more than 41 plant species. However, an established model plant system for unravelling the biochemical pathways of silver nanoparticle (AgNPs) production is lacking. Here we have shown in Arabidopsis thaliana a genetic model plant and in its misexpressing lines of splice variant CONSTANS (COβ) for the silver nanoparticle biosynthesis in vitro. Employing the biochemical, spectroscopic, Transmission Electron Microscopy (TEM), Raman spectroscopy, Nuclear Magnetic Resonance (NMR) and powder x-rays diffraction (Powder XRD) methods and using selected mutants and over-expressing line of Arabidopsis thaliana involved in sugar homeostasis. Additionally, a comparative analysis of AgNPs synthesis using different transgenic lines of Arabidopsis was explored. Here we have shown that plant extract of COβ and gi-j00 (mutant line of GIGANTEA) showed the highest potential of nanoparticle production as comparable to Col-0 and over-expressing line of GIGANTEA (35Si). Silver nanoparticles production in the Arabidopsis not only opens up a possibility of using molecular genetics tool to understand the biochemical pathways, but also could address the mechanism behind different shapes of AgNPs produced using plant extracts.