Plant-mediated green synthesis of zinc oxide nanoparticles for novel application to enhance the shelf life of tomatoes

Tahir Iqbal, Ahmed Raza, Maria Zafar, Sumera Afsheen, Imen Kebaili and Hussein Alrobei

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Abstract

To make fresh fruits, vegetables and other food substances safe and edible for a longer period of time than usual, their shelf life is increased. Therefore, their shelf life enhancement has garnered significant attention from scientists across the globe. Nanotechnology has played a vital role in this field of research for decades. In this study, a simple green synthesis technique was used to synthesize highly efficient ZnO nano-rods based nanostructures. The properties of bio-synthesized ZnO samples were examined using various characterization techniques including Scanning Electron Microscopy (SEM), Energy Dispersive X-ray spectroscopy (EDX), X-ray diffraction (XRD) and UV–visible spectroscopy. To study the effect of ZnO NPs on the shelf life of tomatoes the100 ppm solution of ZnO NPs and ZnO NPs along with Chitosan due to its potential anti-microbial properties have been sprayed on tomatoes. The physiological weight loss (PWL) and physical appearance and overall acceptability using 5-point scale are employed for consideration of variations in shelf life. It was seen that ZnO NPs have unequivocally preserved the tomatoes for a longer period and extended their shelf-life as compared to control and ZnO NPs along with Chitosan. Furthermore, ZnO NPs have shown no toxic effects on tomatoes. In this work, it has been investigated that high concentration of leaf extract gives smaller sized ZnO NPs and larger antimicrobial activity. This research is highly suitable for researchers for choice of suitable synthesis method as well as for the food industry for the improvements in shelf time.