Forage Crop Lolium multiflorum Assisted Synthesis of AgNPs and their bioactivities against poultry pathogenic bacteria in in vitro

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ABSTRACT

Italian ryegrass is one of main feed for livestock animals/birds. It has potential antioxidant metabolites that can improve their health and protect them against various infectious diseases. In this work, we studied synthesis of silver nanoparticles assisted by forage crop *Lolium multiflorum* as a green synthesis way. Potential antibacterial efficacy of these synthesized nanosized silver nanoparticles against poultry pathogenic bacteria was then studied. Aqueous extract of IRG was used as reducing agent for bio-reduction of silver salt to convert Ag^{+} to Ag^{0}metallic nano-silver. Size, shape, metallic composition, functional group, and crystalline nature of these synthesized silver nanoparticles were then characterized using UV–Vis spectrophotometer, FESEM, EDX, FT-IT, and XRD, respectively. In addition, antibacterial effects of these synthesized AgNPs against poultry pathogenic bacteria were evaluated by agar well diffusion method. UV–Vis spectra showed strong absorption peak of 440–450 nm with differ reaction time ranging from 30 min to 24 h. FESEM measurements revealed particles sizes of around 20–100 nm, majority of which were spherical in shape while a few were irregular. These biosynthesized silver nanoparticles using IRG extract exhibited strong antibacterial activities against poultry pathogenic microorganisms, including *Pseudomonas aeruginosa*, *Salmonella typhi*, *Escherichia coli*, and *Bacillus subtilis*. Overall results confirmed that IRG plant extract possessed potential bioactive compounds for converting silver ions into nanosized silver at room temperature without needing any external chemical for redox reaction. In addition, such synthesized AgNPs showed strong antibacterial activities against pathogenic bacteria responsible for infectious diseases in poultry.

KEYWORDS:

Forage crop; Italian ryegrass; Silver nanoparticles; Biological way; XRD; Poultry pathogenic bacteria