

## Synthesis and characterization of silver nanoparticles: effect on phytopathogen *Colletotrichum gloesporioides*

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**Abstract** Colloidal silver nanoparticles were synthesized by reducing silver nitrate solutions with glucose, in the presence of gelatin as capping agent. The obtained nanoparticles were characterized by means of UV–Vis spectroscopy, transmission electron microscopy (TEM), and Fourier transform infrared (FTIR) spectroscopy. The response surface methodology (RSM) was also used to determine the influence of the variables on the size of the nanoparticles. The antifungal activity of the silver nanoparticles was evaluated on the phytopathogen *Colletotrichum gloesporioides*, which causes anthracnose in a wide range of fruits. The UV–Vis spectra indicated the formation of silver nanoparticles preferably spherical and of relatively small size (<20 nm). The above-mentioned was confirmed by

TEM, observing a size distribution of 5–24 nm. According to RSM the synthesis variables influenced on the size of the silver nanoparticles. By means of FTIR spectroscopy it was determined that gelatin, through their amide and hydroxyl groups, interacts with nanoparticles preventing their agglomeration. The growth of *C. gloesporioides* in the presence of silver nanoparticles was significantly delayed in a dose dependent manner.

**Keywords** Silver nanoparticles · *Colletotrichum gloesporioides* · Gelatin · Antifungal activity · Antimicrobial

### Introduction