Synthesis, Characterisation and Efficacy of Chitosan-Stabilised Silver Nanoparticles against *Xanthomonas vesicatoria*, the Causal Agent of Tomato Bacterial Spot

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INTRODUCTION

Recently, nanotechnology have been leading to a technological revolution due to its ability to reduce metals into their nanosize, so to significantly improve their chemical, physical, and optical properties. Silver nanoparticles (AgNPs) owing to their unique properties have gained profound interest. However, several factors such as pH, temperature, pressure, time and the method used for synthesis greatly influence the quality and quantity of the synthesized nanoparticles and their characterisation and applications.

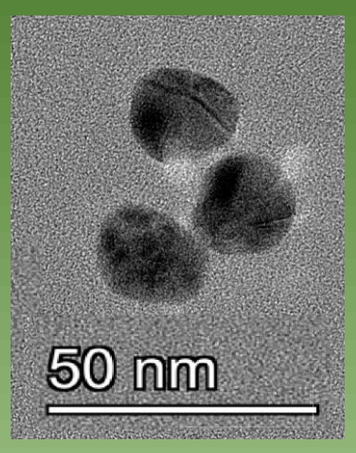
MATERIALS and METHODS

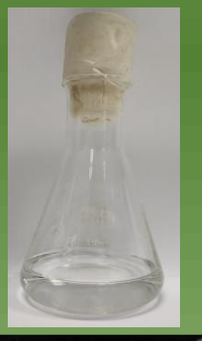
- AgNPs were synthesised by chemical reductions, using chitosan as a capping agent.
- As a precursor of Ag, $AgNO_3$ was added.
- AgNPs synthesised by heating or injecting the precursor solution during two different exposure times (12 or 15 h).
- AgNPs were characterised by Transmission Electron Microscopy (TEM).
- Confirmation of the atomic species was done using the Energy Dispersive X-ray Spectroscopy (EDS).

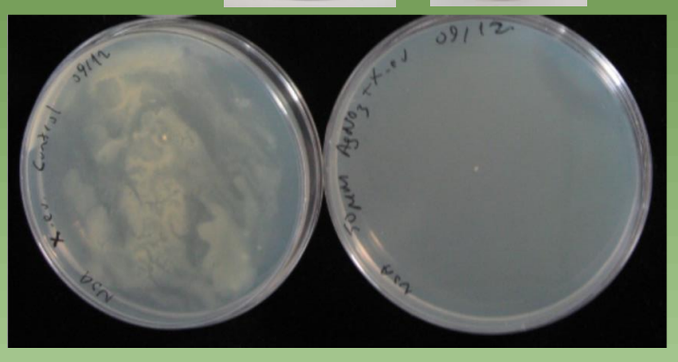
OBJECTIVES

We aimed to:

- understand the effect on AgNPs synthesis of two different methods
- characterise synthesised nanoparticles with TEM.
- assess the *in vitro* efficacy of nanoparticles against *Xanthomonas vesicatoria*.







RESULTS and CONCLUSION

- TEM micrographs demonstrated that synthesised AgNPs are monodispersed, cubic shaped AgNPs, ranging from 5 to 80 nm.
- *in vitro* experiments showed a marked antibacterial activity of AgNPs against *X. vesicatoria*, better than copper sulphate.
- The observed MIC of AgNPs was 15 and 20 µg/ml, when they were obtained by the injection method, with 12 and 15h reduction time respectively.
- Alternatively, when the precursor solution was heated and exposed to 15 h reduction time, nanoparticles agglomerated, thus reduced their activity.
- Our study showed the potential of silver nanoparticles to control *X. vesicatoria*.

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