Aqueous extract of *acacia nilotica* seeds is used as reducing agent for the environmentally and eco friendly synthesis of silver nanoparticles. AgNPs were rapidly synthesized using aqueous extract of acacia nilotica seeds with AgNO₃ solution within 20min the green synthesized AgNPs were characterized by using physic-chemical techniques viz., Uv-Vis, X-ray diffraction(XRD), scanning electron microscope (SEM) coupled with X-ray energy dispersive spectroscopy (EDX) and Fourier transform-infrared spectroscopy (FT-IR) characterized Aqueous extract of The acacia nilotica seeds The X-ray diffraction analysis shows that the synthesized silver nanoparticles are face centered cubic structure. The nanoparticles obtained seeds extract were spherical shaped with an average diameter of 72nm.

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Key words: Green synthesis, Silver nanoparticle, X-ray diffraction.

1. Introduction

Over the past decade, nano materials have been the subject of massive interest due to their potential applications in industrial, biomedical and electronic applications. Presently there is a growing need to develop environmentally benign nanoparticle synthesis processes that do not use toxic chemicals in the synthesis protocols. Synthesis of silver nanoparticles by chemical methods leads to the presence of some toxic chemical species adsorbed on the surface that may have adverse effects in medical applications. Synthesis of nanoparticles using microorganisms or plants can potentially eliminate this problem by making the nanoparticles more bio compatible over [1-3]. The application of noble metal nanoparticle based chemistry for drinking water purification has been summarized for different types of contaminants very recently [4]. Silver nanoparticle-embedded antimicrobial paint [5] is a promising area of environmentally friendly applications. Hence, a variety of techniques including physical and chemical methods have been developed to synthesize silver nanoparticles. The physical methods [6, 7] are highly expensive [8] and chemical methods are harmful to the environment [9, 10]. Therefore, there is a growing need to develop environmentally benign nano particles synthesis processes that do not use toxic chemicals in the synthesis protocols [11, 12]. Silver nanoparticles can be produced either intra- or Extra cellular by using living organisms [13]. Over the past decade, a variety of microorganisms such as bacteria, fungi and yeast have been used to synthesize silver nanoparticles [14-21]. Among the different organisms used for nanoparticle synthesis, plants are of particular interest in metal nanoparticle synthesis because of its advantage over other environmentally benign biological processes as it does not involve harmful chemicals and eliminates the elaborate process of maintaining cell cultures. In the present study, we report the biogenic synthesis of Ag NPs using aqueous seeds extract of acacia nilotica to investigate the bio molecules responsible for synthesis of Ag Nps. acacia nilotica seeds have antibacterial and antifungal activities [22]. In addition, the green synthesized AgNPs reveals excellent antibacterial and antifungal effect against clinical isolates of bacterial pathogens, Gram + Ve and Gram -Ve.

2. Experimental

2.1. Characterization

UV-vis absorption spectra were recorded using Shimadzu 2400 UV-vis at a resolution of 1 nm. The X-ray diffraction measurements were done on a Seifert 3003 TT X-ray diffractometer with Cu Kα radiation with a wave length of 1.52A and the quantitative elemental analysis of the nanoparticles were carried out an Oxford instruments Inca Penta FET x 3 Energy dispersive spectrum (EDS). The FT-IR spectra of silver nanoparticles and acacia nilotica seeds extract was carried out with a Thermo Nicolet FTIR-200 thermo electron corporation.

2.2 Preparation of leaf extract from acacia nilotica seeds

The *acacia nilotica* seeds were gathered from trees growing in the fields of madanapalli, Chittoor (Dt), Andhra Pradesh, India. The seeds were shade dried for 10 days at room
temperature. The fresh *acacia nilotica* seeds extract used for the reduction of Ag+ ions to Ag were prepared by placing 10g of thoroughly washed finely cut seeds in 500ml flask along with 100ml of distilled water and then boiling the mixture for 30min before decanting it. The extract was filtered and stored at room temperature in order to be used further experiments.

### 2.3. Synthesis of silver nanoparticles

An aqueous solution of silver nitrate was prepared by adding 1Mm of AgNO₃ to 100ml of distilled water at room temperature. The aqueous solution was mixed with 50ml of seeds extract at a temperature of 80°C while stirring magnetically at 1000rpm for 1hr the UV-vis spectroscopy characterization. The reaction flask was stands at room temperature for overnight. The obtained residue was filtered under vacuum and the resultant residue was dried in vacuum and the obtained dried powder was used for spectroscopy characterizations.

### 3. Results and discussion

#### 3.1. UV-Visible

The nanoparticles were primarily characterized by UV-Vis spectroscopy, which was provided to very useful in technique for the analysis of nano particles. A well defined peak at 434nm exhibited by the nano metallic Ag particles and consequent color change from the colorless to reddish yellow confirm the successful synthesis of AgNPs. The absorption spectrum of the seeds extract and AgNPs are shown in fig.1.a

![FIGURE 1](image1.png)

#### 3.2. FT-IR characterization

Fig.2.a shows the FT-IR spectrum of extract *acacia nilotica* seeds. FT-IR measurement was carried out to identify the possible bio molecules responsible for capping and reducing agent for the AgNPs synthesized by *acacia nilotica* seeds extract. The bands in the region of 3450 cm⁻¹ were assigned to hydroxyl stretching of poly phenols, where as carbonyl stretching frequency peak appears at 1650 cm⁻¹ leaf extract and these bio molecules reduced Ag⁺ to Ag as well as stabilizing Ag NPs.

![FIGURE 2](image2.png)

#### 3.3. XRD Analysis

The green synthesized silver nanoparticles are highly crystalline with diffraction peaks could be obviously assigned to the face-centered cubic phase of metallic silver. Fig. 3 shows five main characteristic diffraction peaks for Ag were observed at 2θ values of 38.22°, 46.46°, 65.05° and 77.12° are indexed to the (111), (200), (220) and (311) reflections of the fcc structure of metallic silver. The average grain size of the silver nanoparticles formed in the bio reduction process was determined using Scherer’s formula D=0.89 λ/β Cosθ where D is the average particle size, λ is the wavelength of the X-ray, β is the full width at half maximum intensity of the diffraction peak and θ is diffraction angle of the (111) plane of cubic silver nanoparticles and the calculated value is 72 nm.

![FIGURE 3](image3.png)

#### 3.4. SEM and EDX analysis

Fig. 4 revealed that the morphological studied was investigated using scanning electron microscopy (SEM). This picture exhibit that the green synthesized silver NPs are approximately spherical and the particles are slightly agglomerated but its size range 72nm. This is calculated from XRD. The results of energy-dispersive spectroscopy (EDX) analysis are shown in Fig. 5. It is confirmed that the significant presence of elemental silver, which indicates bio reduction of silver ion to elemental silver.

![FIGURE 4](image4.png)
Conclusion
In conclusion, we have established that Ag NPs were synthesized from leaves extract of Acacia nilotica Seeds in a quick method by using environmentally and eco friendly green synthesis. These nanoparticles are found to be highly crystalline as evidenced by the peaks in the XRD pattern corresponding to Bragg reflections from (111), (200), (220), and (311), planes of the fcc structure. The size of the particle is found to be ~72 nm from SEM image analysis.

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4. REFERENCES
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