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# A Review on Green Synthesis of Nano Particles from Solanaceaea Members

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## Abstract

Green synthesis of Nanoparticles (NPs) is the novel desirable method of obtaining NPs from plant source. Solanaceae members are very familiar plants through out the world. These plants can also be considered as good source of NPs, mostly AgNPs, as per the available latest literature. Solanaceae plants are able to produce stable NPs that are having good applications in various fields.

**Keywords**: Nanoparticles, Solanaceae, Green synthesis, applications.

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## I.INTRODUCTION

The objectification of green chemistry approaches and procedures into nanotechnology is of accomplished interest which has gained consequential attention over the past ten years.[1] Likewise, NPs are extensively applied to mortal contact areas and there›s a growing need to develop processes for conflation that don›t use harsh poisonous chemicals . The nanoparticles synthesized from chemical and physical styles generally bear high temperature, pressure, precious outfit, poisonous chemicals, and reagents and most importantly circumscribing agents for the stabilization of nanoparticles; therefore, these styles are poisonous to the terrain and non-eco-friendly.[2]With their antioxidant or reducing parcels they›re generally responsible for the reduction of essence composites into their separate nanoparticles.[1] The conventional styles for the product of NPs are precious, poisonous, andnon-environment friendly. To overcome these problems, experimenters have plant precise green routes like the naturally being sources and their products that can be used for the conflation of NPs .Thus, green/ natural production of NPs is a feasible alternative to chemical and physical techniques. Biological approaches of synthesis have therefore paved way for the “greener conflation” of nanoparticles and these have proven to be better approaches due to slower kinetics.[3] now, green methodologies using Phyto extracts have been developed as an option for common chemical and physical approaches to synthesize noble metal NPs. Due to the presence of reducing agents like alkaloids, polyphenols, and flavonoids which are major phytoconstituents of the plant extracts, and stabilizing agents similar as polysaccharides and proteins, stable metal NPs can be readily synthesized using the plant extracts. Green synthesis provides enhancement over chemical and physical system as it›s economically affordable, atmosphere friendly, easily measured up for large scale synthesis.[4]

## 2.Solanaceae family:

Solanaceae family comprises 90 genera and 3000–4000 species. The family is highly diversified, that includes perennial trees as well as herbaceous annual species and distributed widely in a range of terrestrial habitats from deserts to rainforests. Compared with the large size of the family, only few members of the Solanaceae attained importance in human civilizations as food sources (potato, tomato, eggplant), ornamentals (petunia, Datura, some Solanum species, Schizanthus) and drugs (Tobacco, Atropa, Hyoscyamus, Mandragora).[5]

## 3.General Method of Green synthesis of NP's :

Green conflation of the nanoparticles has achieved significant concentration in recent times. Several metallic nano particles like asGold (Au), Silver (Ag), Cobalt (Co), Copper (Cu), Lead (Pb), Manganese (Mn), Zinc (Zn), Iron (Fe), Magnesium (Mg), Palladium (Pd), are employed in green synthesis. Among the several noble metal nanoparticles, Silver Nano Particles (AgNPs) have attracted special attention due to their unique qualities encompassing felicitous electrical conductivity, chemical firmness, catalytic and antimicrobial conditioning. Because of high face to volume proportion, silver in nanoscale has established comprehensively distinctive properties from bulk particles made from the same material.

Thus, conflation of the AgNPs is an arising area and fascinating subject. In plant grounded conflation, a solvent (generally water) is chosen and employed in step one. Anon-toxic reducing and stabilizer agents are employed in way two and three, independently. In this system, detergents, reducing, and stabilizers agents are named from naturalnon-toxic andeco-friendly substances without any adverse goods on the terrain. Here some of the plant species of Solanaceae members are described with reference to the NPs synthesis by green means and application aspects

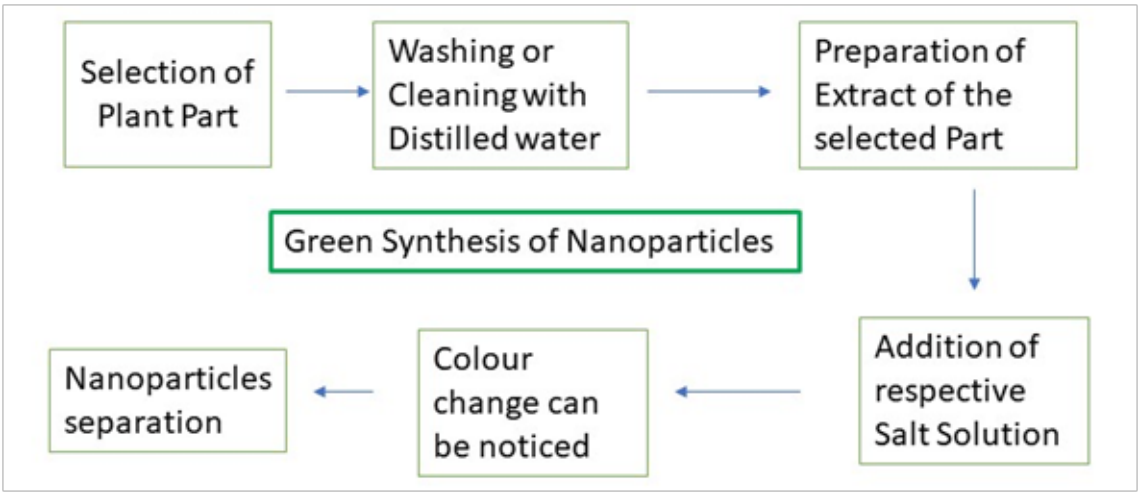


**Fig: Flow chart of Green Synthesis of NP's (6)**

(i). Datura metel:It has been reported that leaf extract of Datura metel is capable of producing AgNPs that shows good stability in solution. Silver nitrate with reducing agent i.e. plant extract has shown a remarkable colour change accompanied with change in pH of the solution.[7]

(ii). Capsicum frutescence:Literature is available stating that fruits of Capsicum frutescence also act as a best source for the formation ofAgNPs. This green chemistry synthetic approach toward the nanoparticles has immense merits. The green synthesized silver nanoparticle from the fruits of Capsicum frutescence shows excellent bactericidal activity against the gram-negative bacteria and moderate activity against the gram-positive bacteria. The findings indicating that biosynthesized silver nanoparticles using the plant source will afford unique opportunities toward the growth of nanomedicine and thus has the budding for utilize in biomedical applications.[8]

(iii).Nicotiana tobaccum:An antimicrobial activity assay of synthesized nanoparticle of Nicotiana tobaccum leaf extract showed maximum zone of inhibition when tested against .Pseudomonas aeruginosa and Escherichia coli. Use of tobacco leaf extract offers an affordable, environment friendly technique for synthesis of large scale AgNPs.[9]

(iv).Solanummammosum:Some reported results suggest that the aqueous extract obtained from Solanummammosum fruit is an effectivelarvicide against Aedisaegypti. Additionally, the reported data showed that these fruit extracts can act as reducing agents for the synthesis of silver nanoparticles, and that said nanoparticle can kill larvae at significantly lower concentrations than the plant´s aqueous extract alone. In fact, the toxicity of AgNPs to mosquito larvae seems to be among the highest reported for AgNPs synthetized using any species belonging to the Solanaceae family. If further reseach will progress successfully to get required information is available,it would be possible definitely to establish whether any compounds derived from S. mammosumshould be considered for further development as insecticides. [10]

(v). Solanum nigrum:Some experimental studies confirmed the synthesis of Ag nanoparticles fromSolanum nigrum leaf extract. Nanoparticles show considerably high anti-microbial effect against both the strains i.e.Salmonella typhi and Staphylococcus aureus when compared to standard antibiotic. This suggests that it could be used as a potential drug against both the bacterial strain in future. [11]

(vi). Solanum xanthocarpum :A plant-mediated, green method of synthesizing silver nanoparticles was successfully performed by employing the leaf extract of Solanumxanthocarpum. The synthesized nanoparticles were characterized by UV-Vis spectrophotometer, FTIR and XRD methods of analysis that confirmed the reduction of Ag+ ions to Ag0 which is supposed through the plant extract as capping agents i.e., the phytochemical constituents found in this plant are acting as the reducing agents. It could be concluded that the biosynthesis of silver nanoparticles with leaf aqueous extracts of S. xanthocarbumprovides potential source for the preparation of pharmacologically useful drugs.[12]

(vii). Solanum lycopersicum:Copper Nanoparticles can be prepared from aqueous fruit extract of Solanum lycopersicum using reduction of Copper sulfate. Thenanoparticle size is 40-70 nm with uniform distribution. It also observed that by increasing the concentration of tomato juicethe concentration of copper nanoparticles is also increasedwith the same concentration of salt. The synthesized copper nanoparticles are of greater stability. This green method of preparation of copper nanoparticle is economical and cheap with no hazardous effect. [13]

(viii). Withaniasomnifera: As a conclusion of some experiments described in the literature, aqueous leaf extracts of Withaniasomnifera are suitable for the green synthesis of AgNPs with potent antimicrobial activity. This is highly relevant since the biomass of this plant is con-sidered a waste product by the phytopharmaceutical indus¬try and hence can be used for further economic processes.These AgNPs have a potential application in many different industries including medical, food, and textiles.[14]

## 4.Conclusion

'Green' synthesis of metal and metal oxide nanoparticles has been a highly attractive research area over the last decade. Numerous kinds of natural extracts (i.e., biocomponents like plant, bacteria, fungi, yeast, and plant extract) have been employed as efficient resources for the synthesis and/ or fabrication of materials. Among them, plantextracts of Solanaceae have been proven to possess high efficiency as stabilizing and reducing agents for the synthesis of controlled materials. This review article explains synthesis mechanism and an updated literature study.

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