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Nanoparticles influence seed germination traits and seed pathogen infection rate in forage sorghum (*Sorghum bicolour*) and cowpea (*Vigna unguiculata*)

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Nanoparticles (NPs) influence germination and growth of plants and also reported to have antimicrobial effect on seed. In the present study, effect of four metal/metal oxide NPs *viz.* Zinc oxide (ZnO), Titanium oxide (TiO_2), Copper oxide (CuO) and Silver (Ag) on seed germination traits and seed pathogenicity of forage sorghum [*Sorghum bicolour* (L.)] and cowpea [*Vigna unguiculata* (L.)] was assessed. NPs were synthesized before seed treatment and characterized for size and chemical property by particle size analyzer (PSA), scanning electron microscope (SEM), transmission electron microscope (TEM) and X-ray diffraction (XRD) following standard procedure. All NPs were pure and confirmed as under nano-size (>90% of particles below 100 nm). Seed surfaces were observed under SEM for natural openings that apparently acted as entry points for NPs. Seeds were treated with NPs at 0 mg (D0), 750 mg (D1), 1000 mg (D2) and 1250 mg/kg of seed (D3). Except TiO_2, all other NPs enhanced germination at lower dose (D1), but germination was reduced at higher dose (D3) ($p=0.05$) as compared to control (D0). Seed vigour traits (germination, shoot length, root length and seedling dryweight in this experiment) were also influenced by NPs. Ag NP was proved to be strong antimicrobial agent in this study.

Keywords: Antimicrobial, Nanotechnology, Shoot and root length