



Review

Nanoagroparticles emerging trends and future prospect in modern agriculture system



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ABSTRACT

Increment of technical knowledge has remarkably uplifted logical thinking among scientific communities to shape the theoretical concepts into near product-oriented research. The concept of nanotechnology has overwhelmed almost all forms of lives and has traded its applications in myriad fields. Despite rapid expansion of nanotechnology, sustainable competitions still do exist in the field of agriculture. In current scenario, agriculture is a manifestation demand to provide adequate nutrition for relentless growing global population. It is estimated that nearly one-third of the global crop production is destroyed annually. The loss owes to various stresses such as pest infestation, microbial pathogens, weeds, natural calamities, lack of soil fertility and much more. In order to overcome these limitations, various technological strategies are implemented but a majority of these have their own repercussions. Hence there is a scrawling progress on the evaluation of nanoparticles into agriculture sector which can reform the modern agricultural system. Applications of these nanomaterials can add tremendous value in the current scenario of a global food scarcity. Nanotechnology can address the adverse effects posed by the abundant use of chemical agrochemicals which are reported to cause biomagnification in an ecosystem. Based on these facts and consideration, present review envisages on nanoparticles as nanoherbicides, nanopesticides, onsite detection agro-pathogens and nanoparticles in post harvest management. The review also elucidates on the importance of nanoparticles in soil fertility, irrigation management and its influence on improving crop yield. With scanty reports available on nanotechnology in agriculture system, present review attributes toward developing nanoagroparticles as the future prospect which can give new facelift for existing agriculture system.

1. Introduction

Increment of technical knowledge has remarkably uplifted logical thinking among scientific communities to shape the theoretical concepts into near product-oriented research. One such imagination of Feynman was “There's plenty of room at the bottom” which resulted in recognition and emergence of nanotechnology as one of the key emerging technologies of the decades (Feynman, 1960). Introduction of nanotechnology in different sectors has significantly contributed in enhancement of applicative properties (Nikalje, 2015). One of the important aspects in nanotechnology is evaluation of nanomaterials. Use of nanomaterials has led to a new era, the nano-revolution which unfolds maneuvering particles with at least one dimension at nano-scale

(Syed et al., 2016). Nanomaterials are considered as particles of the century and have drawn unequivocal attention (Zhao et al., 2014). These nanomaterials have traded their progress in various sectors due to their size-structure dependent physicochemical properties and emerged as the most inspiring materials in technical world (Porchezhian and Noorjahan, 2016). Nanomaterials with minuscule size bear high reactivity owing to the large surface plasmon resonance which significantly advances their analytical abilities (Baker et al., 2015). Despite rapid expansion of nanotechnology, sustainable competitions still do exist in field of agriculture sector. In the current scenario, the agricultural sector must promise adequate nutrition for a rapidly expanding global population (Mba et al., 2012). Unfortunately, it is estimated that nearly one third of the global crop production goes waste

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