

Nanofertilisers in improving yield and quality of various fruits

Hanisha A

Nanofertilisers (NFs) play an important role in improving the quality of various fruits by enhancing their reproductive growth, yield and shelf life. They are widely used, either as soil-based or spray-based, in order to provide nutrition to the crops, with high efficiency and low waste. The use of NFs like zinc, boron, chitosan along with nanocomposites, like nitrogen, phosphorous, potassium, magnesium (NPKMg) and calcite, has shown significant effect on various fruits like mango, pomegranate, strawberry, coffee and grapes. Due to the size range of nanoparticles i.e. from 1-100 nanometres, they can easily penetrate the plants through stomata. After penetration, NFs can move through different pathways like apoplastic, symplastic etc., which influences the effectiveness and changes the reactivity and response of plants. An important feature is the concentration of NFs used; which has both positive and negative effects. To avoid the negative effects, NFs are used in the encapsulated form to enhance absorption in plants, as well as to minimise nutrient losses. Encapsulation is either done in a way that the nutrients are present inside or they are coated with thin polymer films. They can also be delivered as emulsions of nanoparticles having macro and micro nutrients. In woody plants, like strawberries, NFs are directly sprayed onto plants. In fruit trees, they are sprayed onto the branches and leaves. In addition, they help plants in overcoming abiotic stress and in boosting their shelf life. NFs have the nutrients at the nano level, which attach themselves to the soil very easily and release the nutrients in a stable manner, which contradicts the mechanism of bulk fertilisers. The negative effects of the usage of high concentrations of NFs include their toxicity to plants. Due to their tiny scale and high penetrability, they can affect the growth and development of plants. Before the application of NFs, their pros and cons have to be evaluated, in terms of concentration, to obtain the best results.

Keywords: Nanofertilisers, Composites, Encapsulation, Fruit crop, Nanoparticles

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