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Engineered Silica Nanoparticles and SiNps containing Controlled Release Fertilizer for drought and saline areas

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Silicon supplementation has been used in the beginning of this cenutury, to increase salinity tolerance in plants, therefore Silica nanoparticles (SiNps) can also be used as a trial to improve salinity tolerance in plants that are grown in drought and salt effected areas. In this study Silica Nps have been synthesyzied by some modification in the conventional method of Stober by thermal hydrolysis of Tetraethylorthosilicate. A compound Controlled Release Fertilizer (CRF) was synthesized that carried NPK and silica Nps inside the core and Chitosan as the first semi-permeable coating and Sodium Alginate and Kaolin as an outer most superabsorbent coating. The synthesized SiNps were characterized by TEM, SEM and XRD while the CRF was characterized by FTIR. The water absorbency of CRF beads showed that they can absorb large amounts of water and double their weight. The Nutrient released rate from CRF beads was very slow and sustained for six months at room temperature. The SiNps containing superabsorbent CRF was capable of releasing the nutrients slowly, withhold large amounts of water therefore can help plants control the salinity and survive better in drought and saline conditions without harming the environment. The synthesized compound fertilizer is biocompatible, biodegradable and nontoxic so helpful in growing plants in drought and salt effected areas.

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