

## **UGC Minor Research Project**

### **Nano priming for increasing seed germination efficiency in soybean**

Oilseed crops have been considered to be the backbone of agricultural economy of India from time immemorial. Soybean (*Glycine max* (L) Merr.) from Fabaceae family is one of the highly utilized annual crops, having economically useful compounds. Seed priming is one of the pre-sowing treatments for enhancing the seed performance. In India, zinc is one of the important yield limiting nutrients. It is required for synthesis of chlorophyll pigments as well as in biosynthesis and functioning of several important enzymes in metabolic pathways. The main objective of this project was to apply the utilization of ZnO nano particles as priming agents for increasing the seed germination efficiency. Hence to ascertain the use of ZnO nanoparticles, certified soybean seeds (MACS-13) were treated with various concentrations of ZnO nps for a specific period. Preliminary experiments were performed to determine the duration of time as well as concentration of nps for priming. Triplicates of each experiment were maintained. Physical parameters like percent germination efficiency, speed of germination, root length, shoot length, seedling vigour index, fresh weight, dry weight as well as conductivity of seed leachates were studied. Biochemical parameters which included analysis of protein content, chlorophyll content of seedlings and activity of catalase and nitrate reductase was studied. It has been observed that seeds responded variably to various concentrations of nanoparticles. The seeds primed with 100ppm concentration of ZnO nps showed marked response with respect to better germination efficiency as compared to unprimed seeds as well as seeds primed with water. These seeds showed better viability. The activity of catalases which act as one of the enzymes of anti-oxidative system in cells was also significant in seeds primed with 100 ppm of nanoparticles. This indicates that these seeds maybe protected from oxidative damage by reactive radicals. Greater nitrate reductase activity was seen in all treated seeds as compared to unprimed seeds. Seeds primed with 50 ppm concentration showed considerable effects with respect to seedling vigour as well as increased dry weight. These results could signify the use of nanoparticles as promising priming agents for farmers although these results can be augmented with more biochemical evidences. Hence application of ZnO nanoparticles on seeds, improved germination and related physiological parameters. However, these findings should be verified on large scale field condition before recommending to farmer for adoption.

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