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Development of inoculation technology for leguminous plants: seeds coating with zeolite additives

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Seed coating with rhizobial bacteria and different protective additives is sustainable agricultural practise in plant production for enhancing yield and crop performances as well as stress resistance. The role of additives is to maintain the viability and efficiency of bacteria directly applied to the seed. In this study, the different zeolite additives were evaluated as carriers for alfalfa and soybean rhizobia in seed coating. The four different coating treatments were tested for pre-inoculation of soybean and alfalfa seeds, with two highly efficient nitrogen-fixing *Bradyrhizobium* sp. strains (518 and 542) and two *Ensifer meliloti* strains (4193cs and 218), including carrier with 0.5% agar, nanozeolite, micronized zeolite and zeolite. After four months of storage at room temperature, the seed germination was tested in the laboratory conditions, and the field experiment with inoculated soybean seeds was set up. The pre-inoculated seed of both legumes showed almost 100% germination compared to non-inoculated seeds. The yield of soybean seed in the field experiment depended on the strain applied as well as carrier, compared to the seeds inoculated immediately before sowing. The increase in soybean yield was detected in all treatments compared to non-inoculated seeds (up to 133%). If compared pre-inoculated seeds with the inoculation with the same strain immediately before sowing the most pronounced effects were noticed using strain 542. The yield increases up to 33% when the coating agents was nanozeolite. The results indicate that seed coating is efficient agrotechnical measure but being dependent from the strain used as well as coating agent.

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