The Soil Re-Union
Science for Healthy Soils

4th International and
16th National Congress
of the Serbian Society
of Soil Science

Serbian
Society of
Soil Science

THE BOOK OF ABSTRACTS

Vrdnik, Fruške Terme, Serbia,
20-23. October 2025

Congress Organizer: Serbian Society of Soil Science
Co-organization: Institute of Field and Vegetable Crops,
National Institute of the Republic of Serbia

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INOCULANT FORMULATION: EFFECTS OF ZEOLITE ADDITIVES ON ALFALFA AND RHIZOBIAL SYMBIONT

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ABSTRACT

Inoculants containing rhizobial bacteria are bio-inoculants which represent microbiological N fertilizer and they contain selected highly effective and highly competitive rhizobial bacteria placed in suitable carrier. The role of carrier is to maintain the viability and efficiency of bacteria used as active agent and to increase the shelf life of inoculant. The most widespread formulation consists of peat as the rhizobia carrier and formulations of inoculants using zeolites as additives are common. Nanogranulation of the zeolite by increasing its surface would enhance its water and nutrients retention efficiency in the layer of the inoculant on inoculated seeds, making the bacteria more resistant to desiccation causing nano-carriers superiority over other carriers. In this study, 15 different inoculants were tested, five highly efficient nitrogen-fixing rhizobial *Ensifer meliloti* strains named 218, 225, 252, 4148s and 4193cs in three different peat carriers, including peat carrier with regular zeolite, zeolite nanoparticles, or $CaCO_3$. The initial number of rhizobial cells of all strains exceeded 10^9 in all formulations. After one month of storage at room temperature the number did not differ significantly among strains and formulations but after two months the number was the higher in formulation with zeolite nanoparticles $>10^{10}$ for strains 252 and 4148s. This trend continued in the next 6 months. The nodulation ability and efficiency of inoculants was confirmed in the nodulation test with alfalfa after three and six months of storage, indicating good performance of all evaluated inoculant formulations, with the most performant nano zeolite as an additive.

Key words: alfalfa, soil quality, zeolite, peat, carrier