

Competitive Ability of Various Lucerne (*Medicago sativa* L.) Varieties to Stimulate Biological Nitrogen Fixation

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Seed inoculation is required to increase forage yield of lucerne (*Medicago sativa* L.) through N-fixation to reduce the external inputs. The nitrogen fixation was affected mainly by host variety, *Sinorhizobium meliloti* strain and their interactions. In an pot experiment, five Egyptian varieties (New Valley, Giza-1, Ismailia-1, Ismailia-94 and Sewa), two American (Legend and WL-605) and one French (Luzelle) were inoculated using four *Sinorhizobium meliloti* strains: two Egyptian (ARC-1 and ARC-2), one American (TAL) and one Canadian (A₂). The inoculums of strains were obtained from Microbiology Laboratory, Agricultural Research Center, Giza, Egypt. The experiment was a randomized complete block with a 8 x 5 factorial design and four replications, where, the main pots were eight lucerne varieties and sub-pots were four *Sinorhizobium meliloti* strains and one treatment of N-fertilizer as control equivalent to 40-kg N ha⁻¹ of ammonium nitrate. The mean of four cuts at 10 to 20% bloom was used to estimate the ability of alfalfa varieties to stimulate biological nitrogen fixation by means of plant growth parameters and the number of nodules / plant were recorded. There were significant differences for all measured traits: nodules number, plant height, shoots number, forage fresh and dry weights, root dry weight, leaf : stem as well as root : shoot ratios, so, the mean squares due to varieties, *Sinorhizobium meliloti* strains and their interactions were significant for all characters. Also, our results demonstrated that, the growth and nodules number / plant were significantly affected by the varieties and *Sinorhizobium meliloti* strains implying that symbiotic efficiency depends upon the genotypes of both partners. In addition, nodules were not observed in non-inoculated (control) pots indicating no contamination by exogenous rhizobia. These results were in agreement with **Bromfield et al. (1986)** who stated that, the alfalfa varieties varied in their preference for specific *Sinorhizobium* strains. In general, non-inoculated alfalfa had the highest R : S ratio, this may have occurred because non-inoculated plants used more resources to develop roots to facilitate N-uptake (**Zhu et al., 1998**). The results indicated the American TAL and the Egyptian ARC-2 strains were the most competitive among the strains tested. Genetic correlation values and heritability estimates revealed that, the selection for improved biological nitrogen fixation in alfalfa probably would be more effective when based on forage as well as root dry weights.

References

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