

Field Study on the Effect of Selected *Rhizobia meliloti*
Strains on the Yield of Alfalfa (*Medicago sativa*)
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It has been a common practice by farmers in many areas of the world to inoculate legume seed with rhizobia. With proper strains of rhizobia, much nitrogen can be fixed from the soil air and eventually utilized by the plant, resulting in greater yields with reduced capital inputs. In Arizona, modern research in alfalfa-rhizobia symbiosis has been conducted since 1961 but without significant increases in nitrogen fixation or yields as a result of inoculation. This study tested native Arizona rhizobia strains on alfalfa cultivars Lew, Ranger, Hayden PX, and two lines of Hayden called Heat-tolerant and Salt-tolerant.

The native strains, labeled 1408, 1403, 1394 and 1414 were coated onto the alfalfa seed by an industrial coating process. The seed was planted in mid-October of 1977 in five replications at the University of Arizona Experimental Farm at Marana, Arizona. Five harvests were made in 1979 and the yield data were compared using the Student-Neuman-Kuehl or SNK test. Among cultivars Hayden PX, Salt-tolerant and Heat-tolerant no significant increases in yield, due to inoculation with native rhizobia strains were found. However, in Ranger alfalfa, significant yield increases with strain 1408 occurred in the April and May harvests (Fig. 1).

Fig. 1. Rhizobia treatment effects on average harvest yield for alfalfa cultivars over the entire growing season

Cultivar	Check	Treatment (gms)				Coating without inoculum	Commercial inoculum
		Strain 1394	Strain 1403	Strain 1408	Strain 1414		
Ranger	150.16 ^a	140.00 ^a	134.75 ^a	208.07 ^b	124.09 ^a	108.65 ^a	146.71 ^a
Lew	199.62 ^b	215.88 ^b	192.50 ^b	200.02 ^b	194.36 ^b	109.56 ^a	212.59 ^b
Hayden PX	208.05	186.46	205.00	212.24	202.02	229.47	213.80
Heat-tolerant	208.07	209.42	199.88	204.40	203.91	208.50	195.95
Salt-tolerant	205.16	182.84	195.20		184.04		175.69

* data with same superscripts in each row are not significantly different at 0.05 level of SNK test

Further evaluation of Ranger with strain 1408 in Northern Arizona will verify if the symbiosis is as effective in the area where the cultivar is adapted.

Examination of alfalfa plants during the growing season showed the roots of the inoculated plants to be well nodulated at time of the first harvest. However, with subsequent harvests, nodule numbers were significantly reduced, and at final cutting, virtually no active nodules were seen. At the present time, it appears that advantages to inoculation probably occur during the first and second cuttings at the lower elevations. The development of alfalfa cultivars able to withstand high summer temperatures may enhance the rhizobia symbiosis during the entire growing season.