Soybean Rizobia Inoculation Has a Positive Contribution to Argentine Grain Production

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INTRODUCTION

In Argentina, the use of microbiological products that enhances crop nutrition and growth is increasing. It is estimated than more than 70% of the soybean [*Glycine max* (L.) Merrill] crops are annually inoculated at planting with *Bradyrhizobium japonicum* providing not only better N nutrition but also greater grain yields.

Objective:

- To quantify the contribution of the use *Bradyrhizobium japonicum* on soybean production in soybean rotated lands under the different crop production conditions of the crop in the country.

MATERIALS AND METHODS

Growing seasons (2): 2007/8 and 2008/9

Treatments (2): Untreated control and seeds inoculated with a *B. japonicum* formulation providing more than 10^5 units of rizobia forming colonies per soybean produced by INTA.

Replicated trials in 14 sites located in the provinces of Buenos Aires (Castelar, S.A.de Areco, Gral. Villegas, Pergamino and Cnel. Suárez), Entre Ríos (C. del Uruguay and Paraná), Salta (J.V. González), Formosa (El Colorado), Tucumán (La Ramada and El Manantial), Santa Fe (Oliveros and Rafaela) and Córdoba (J. Posse).

Strip trials in 115 locations distributed among the Argentine soybean production region.

Measurements:

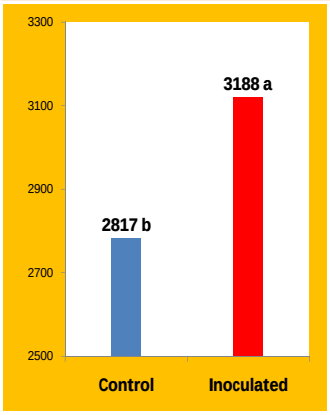
Number and nodule dry mass at R5 growing stage, shoot dry matter at R6 and grain production and yield components (grain number) at physiological maturity.

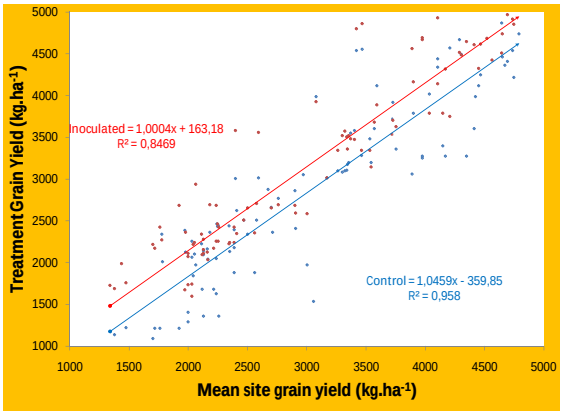
N derived from the biological N fixation process was evaluated using the natural ^{15}N abundance method (only in selected replicated trials)

Experimental design: completely randomize block with 4 or 5 replications and plots with 5 rows of 5 m in length and distanced 0.52 m each.

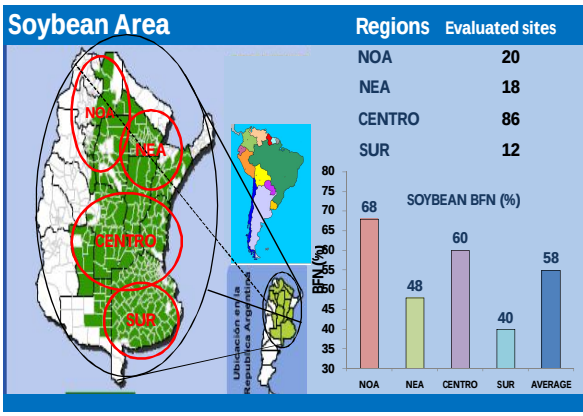
RESULTS

Soybean grain yield during 2007/8 and 2008/9 growing seasons





Soybean BFN in Argentina



Variable	Nodules (Number pl^{-1})	Dry mass nod (mg pl^{-1})	Shoot Biomass (Mg ha^{-1})	Grain Yield (kg ha^{-1})	Grain Number m^{-2}	Harvest Index
Control	23	103	9,7	2,8	1748	44
Inoculated	26	114	11,3	3,2	1884	47
Difference (inoculated – control)	3	11	1,6	0,37	136	3
p values	0,27	0,46	0,12	0,017	0,22	0,005

CONCLUSIONS

✓ Averaged over 115 locations and 2 growing seasons the soybean seed inoculation with *Bradyrhizobium japonicum* enhanced the crop grain yields independently of the productivity of the site.

✓ The inoculated crops showed better:

- Nodulation Number (+12,4%)
- Nodulation Biomass (+11,2%)
- Shoot biomass (+16,4%)
- Grain number (+7,8%)
- Grain yields (+13,2%)
- Harvest index (+6,6%)

✓ The BFN provides between 40 and 68 % of the soybean N requirements for growth.

✓ These results support the convenience of rizobia inoculation for avoiding N nutrition limitations and growth of soybean crops under production in Argentina.

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