Agronomical Performance of Common Bean Inoculated with New Rhizobial Isolates

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INTRODUCTION

- ✓ Brazil is the third world producer of common bean (*Phaseolus vulgaris* L.) with about 2,7 million hectares of harvested area;
- ✓ Common bean is the main protein source for the poorest population and contributes with 25% of protein on the dietary of Brazilian population;
- ✓ About 75% of the grain yield of common bean in Brazil comes from smallholders;

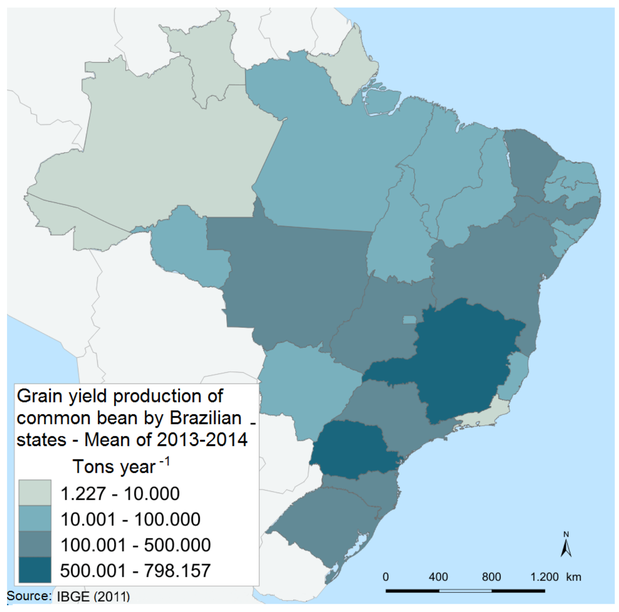

Fig1. Mean grain yield production of common bean by each Brazilian state.

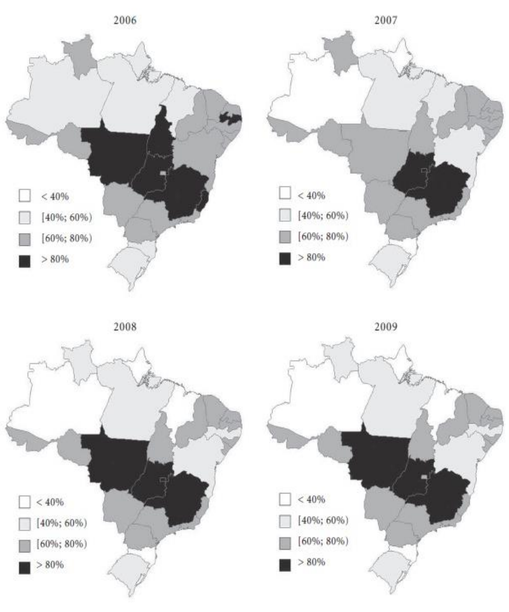

Fig2. Common bean consumption frequency in more than four times a week between adults living in Brazilian state capitals.
Source: Velásquez-Meléndez et al. (2012)

- ✓ Almost the total cultivated area of common bean in Brazil is managed with N-fertilizer;
- ✓ Common bean can obtain N from biological nitrogen fixation (BNF) process.

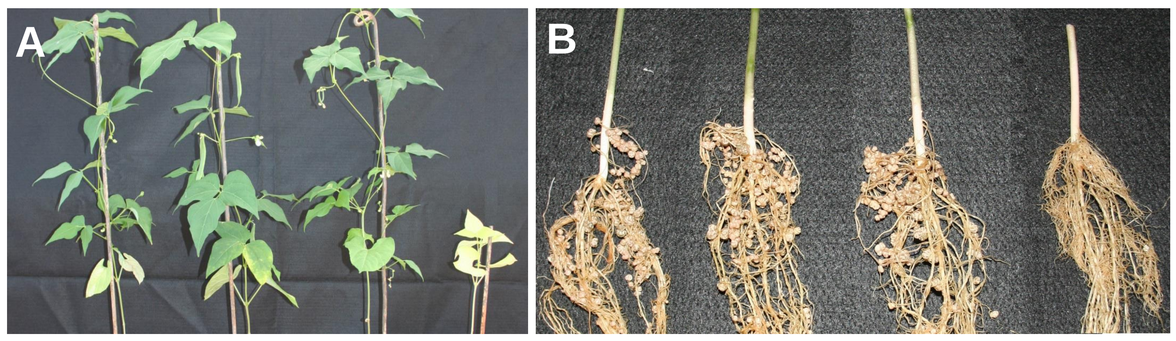

Fig3. Shoot (A) and root (B) systems of common bean inoculated and non inoculated with *Rhizobium tropici*.

MATERIAL AND METHODS

- ✓ Two experiments were carried out under field conditions using different technological level;
  - ❖ Low technology use – smallholder area;
  - ❖ High technology use – experimental station of Embrapa;
- ✓ 17 new rhizobia isolates were tested against the three commercial strains of *R. tropici* and N-fertilizer treatment.

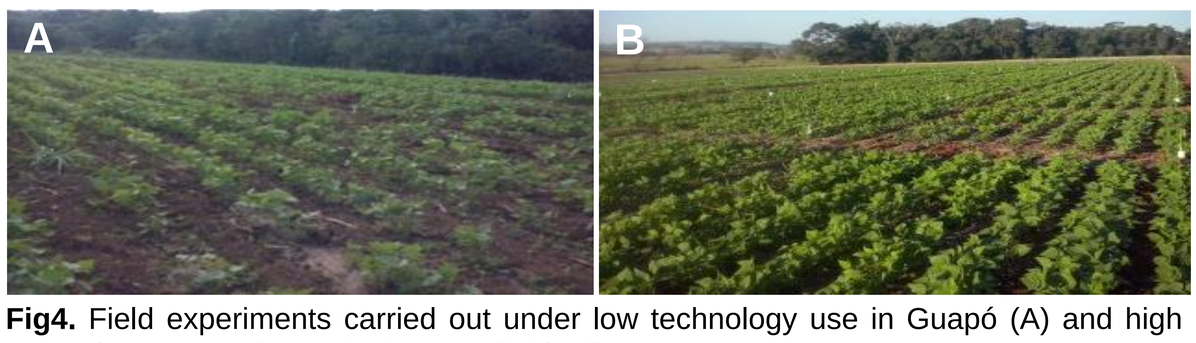

Fig4. Field experiments carried out under low technology use in Guapó (A) and high technology use in Santo Antônio de Goiás (B).

RESULTS

Tab1. Significance of "F" test for the effects of site (S), N source (N) and its interactions (S x N) on the number of nodules (NN), nodule dry mass (NDM), root dry mass (RDM), leaf area (LA), shoot dry mass (SDM), number of pods (NP), number of grains (NG) and grain yield (GY) of common bean inoculated with new rhizobia isolates.

	Variation Sources			
	Site (S)	N source (N)	S X N	CV%
DF	1	21	21	-
NN (nº plant^{-1})	8.36**	1.64*	2.2 **	21.98
NDM (g plant^{-1})	12.27**	1.09^{ns}	1.96*	9.66
RDM (g plant^{-1})	46.26 **	3.00 **	2.16 **	9.38
LA (cm² plant^{-1})	87.41**	2.64 **	1.88*	12.18
SDM (g plant^{-1})	68.49 **	5.92**	2.27**	11.27
NP (nº plant^{-1})	79.11**	3.59**	3.02**	9.28
NG (nº plant^{-1})	109.93**	2.78**	2.76**	10.96
GY (kg ha^{-1})	1501.35**	3.35**	1.98*	9.27

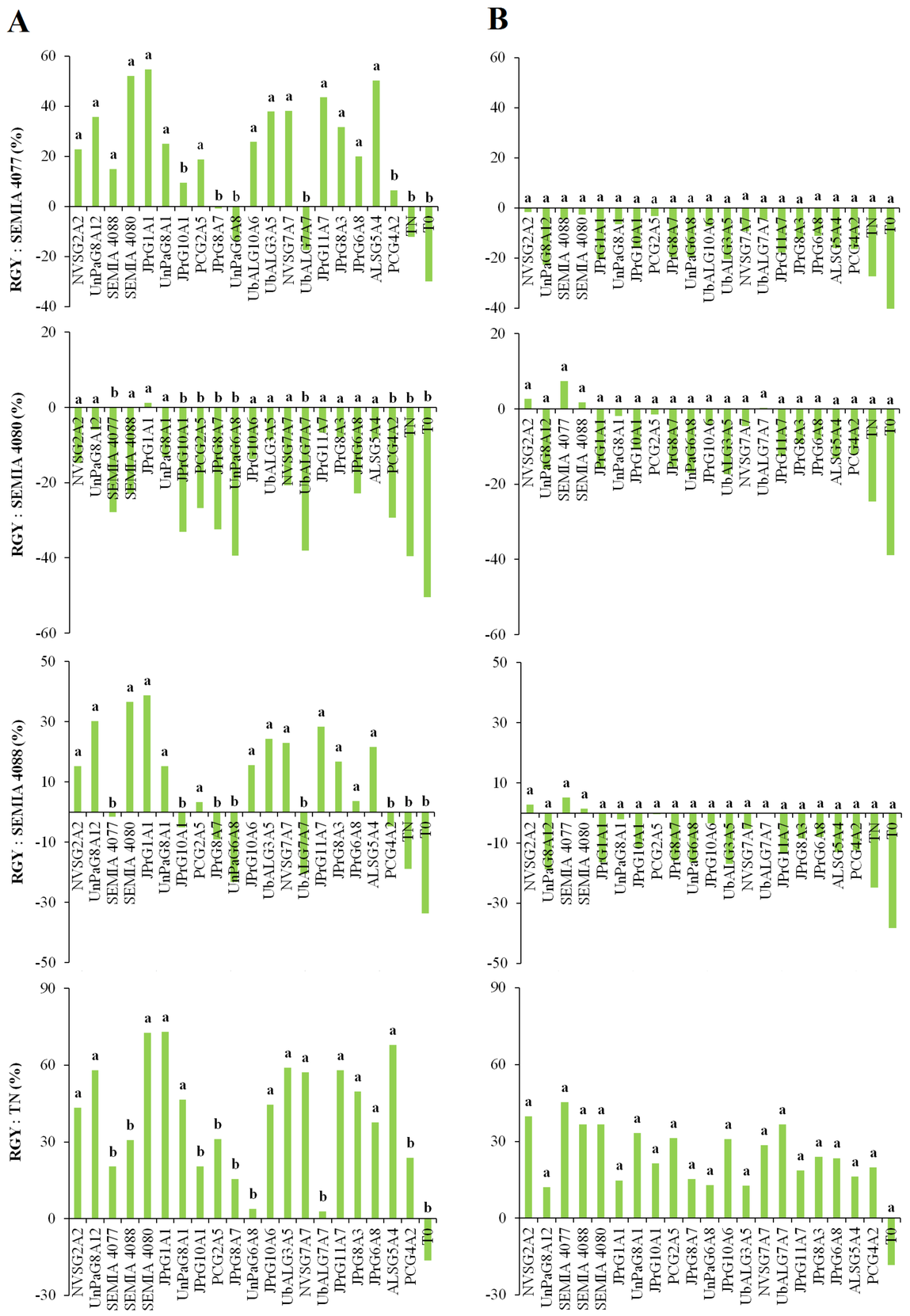

Fig5. Relative grain yield of inoculated common bean under different low technology use in Guapó (A) and high technology use in Santo Antônio de Goiás (B).

CONCLUSIONS

- ✓ About 70% of the new rhizobia isolates show similar or better agronomical efficiency as the commercial strains;
- ✓ Inoculated common bean show better relative grain yield as compared to N-fertilized in both, low and high technology use systems.