Effect of different inoculants in growth of *solanum tuberosum* and the control of *rhizoctonia solani*

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INTRODUCTION

The soil is one of the most complex ecosystems, it contains innumerable organisms that make life possible (FAO, 2015), many are growth promoters (PGPR) and phytopathogenic antagonists that increase their use as mixed inoculants and if these microorganisms cannot be combined into a single product, they are manufactured separately (Sánchez *et al.,* 2019). Your application is not only one of the solutions for sustainable agricultural productivity but also to progressively recover soil biodiversity (Pratush *et al.,* 2018). The objective was to evaluate the coinoculation of different rhizosphere PGPRs with the strain Azo16M2 under greenhouse conditions and the inoculation in field conditions in potato cultivation.

About inoculants

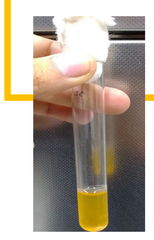
Combination

-Each of the 11 PGPR strains

Azo16M2

-Positive control (*R. solani*)
-Negative control (without inoculation)
-Chemical treatment (Benomyl)

LEMYB-UNALM strain bank (-80°C)



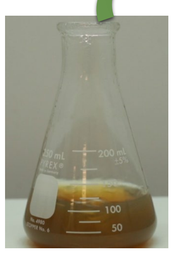
1 mL [10^8 CFU / mL]

Greenhouse

After the screened

Agriculture field

Strains → 4BPP8 , BPP4 MRPJ4, 5ACPP5 (Verástegui *et al.*, 2019)



METHODOLOGY

a. Greenhouse

T°min 15°C, T°max 21°C, HR 58-80%.

Botanical seeds disinfected (Zúñiga, 2012) of *S. tuberosum* cultivate Yungay x Ccompis were sown in germination trays with sterile substrate (organic matter and sand in 1: 1 ratio) (Osorio, 2009). , pH 7.32, EC 1.27 (dS/m), 4.07% organic matter and frank sand texture.

Transplanted at 30 days into pots. The experimental design was completely randomized with 14 treatments and 5 repetitions.

1.Coinoculation in the transplant.
2.Recoinoculation at 20 and 30 days directly to the plant neck.
3.Infection with *R. solani* was performed at 25 and 40 days.

Plant height, chlorophyll index (CI), length of chancre, fresh and dry weight of the small tuber at 90 days were evaluated.

b. Agriculture field

Centro Poblado de Vicso, Distrito de Oroctuna, Provincia de Concepción-Junín (Perú).
Weather: T°min 7°C, T°max 21°C, HRmin 58%, HRmax 66%. pp 91 - 102 (mm/month).

Soil characteristics: pH 7.55, EC 0.25 (dS/m), organic matter 2.62% and clay loam texture.

It was planted pre-basic seeds of two potato varieties, Unica and Canchan.
Inoculation and re-inoculation was performed at sowing and 15 days after the emergency to the plant neck and leaves.

Experimental design was completely randomized blocks with factorial arrangement of 2 varieties, 5 treatments and 4 repetitions. Emergency %, plant heigth and chlorophyll were evaluated.

Table 1: Effect of inoculants on growth and damage reduction in potato plants.

Treats.	Chlorophyll (nm)		Plant height (cm)		Chancre (mm)		Small tuber Fresh weight (g)		Small tuber Dry weight (g)	
4BPP8+ Azo16M2	48.92	a	23.26	a	30.1	efg	0.71	a	0.09	a
BPP4+ Azo16M2	43.54	ab	21.44	ab	37.1	def	0.61	abc	0.077	abc
5ACPP5+ Azo16M2	48.73	a	19.04	abc	28.6	fg	0.68	ab	0.086	ab
Benomyl	42.16	ab	18.21	abc	18.7	g	0.25	abcde	0.032	abcde
Negative Control	37.38	bc	14.10	cd	0.0	h	0.20	de	0.025	de
Positive Control	35.38	bc	15.20	cd	71.3	a	0.05	e	0.006	e

*** LSD test (p<0.05)**

MAIN RESULTS

In greenhouse, Coinoculated plants with different bacteria showed better results than the control with pathogen and without pathogen (Fig. 1A). The 4BPP8-Azo16M2 interaction was the one that provided the highest plant height, the highest chlorophyll content and the largest small tuber weight, compared to the controls (Table 1). Also all bacteria decreased damage to the plant neck (smaller chancre size) compared to pathogen control (Table 1). In field (Fig. 1B), there were no differences in the percentage of emergence of var. Unique, however in var. Canchan the effect was variable according to the inoculated strains (Fig. 2), in the CI the strain MRPJ4 shows the best result for both varieties, at plant height the 4BPP8 and MRPJ4 were the best in var. Unica and Canchan respectively (Figure 3).

Fig.1: A) Effect of inoculation on plant growth (C-, C+, and 4BPP8+Azo16M2); B) Potato crop *var. Unique* and *Canchan* in the Village Center, Vicso-Junín.

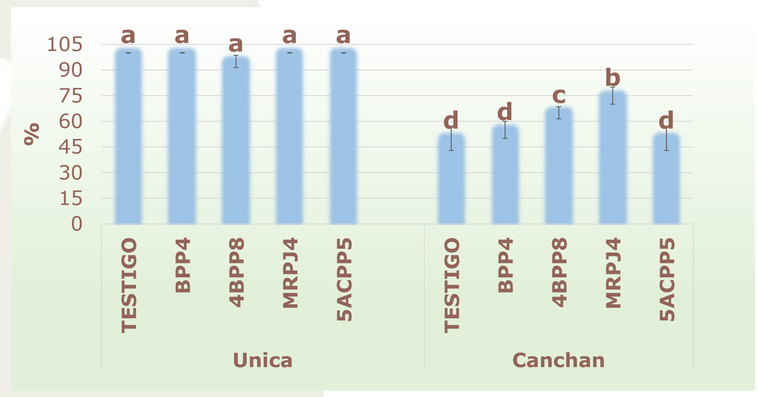


Fig. 2: Effect of inoculation in the emergence of potato plants var. Unique and Canchan.

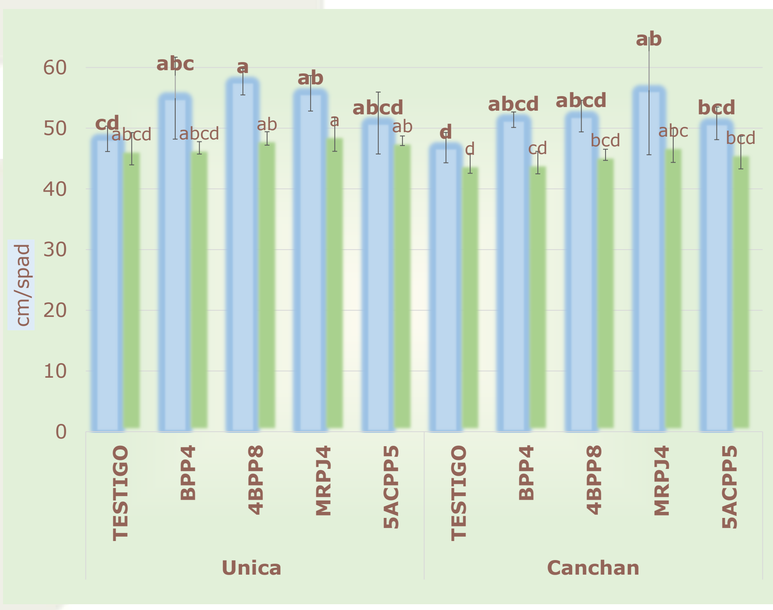


Fig. 3: Effect of inoculation in the height plants and clorophyll potato plants var. Unique and Canchan.