Assessment of *Bacillus megaterium* as durum wheat (*Triticum durum*) biofertilizer

Peral-Aranega, Ezequiel*; García-Fraile, Paula; Rivas, Raúl.
Department of Microbiology and Genetics. University of Salamanca.
e-mail: epa@usal.es

Source

Wheat Rhizosphere

MORS55

Identification: MALDI-TOF

Identified as *Bacillus megaterium* with a high probability score

Identification: 16S rRNA sequencing

STRAIN	ID NCBI TYPE STRAINS	PER ID
MORS55	*Bacillus megaterium* NBRC 15308^T	100%

*More than 1500 bps obtained from the whole genome sequence. Aligned with BLASTn.

Phenotypical Characterization

In vitro results were positive for siderophore synthesis, as well as for tricalcium and hydroxyapatite phosphate solubilization. However, was negative for potassium solubilization.

Siderophores synthesis after 3 DPI (left), tricalcium phosphate solubilization after 9 DPI (middle) and cellulose synthesis 3 DPI (right).

Presumptive production of ACC deaminase

STRAIN	T1	T2	T3	T4	T5	T6	T7	Result
MORS55	-	-	+	+	-	+	+	NEGATIVE

Treatment	Conditions
T1	Nitrogen and ACC
T2	ACC only
T3	Mannitol and ACC
T4	Nitrogen, mannitol and ACC

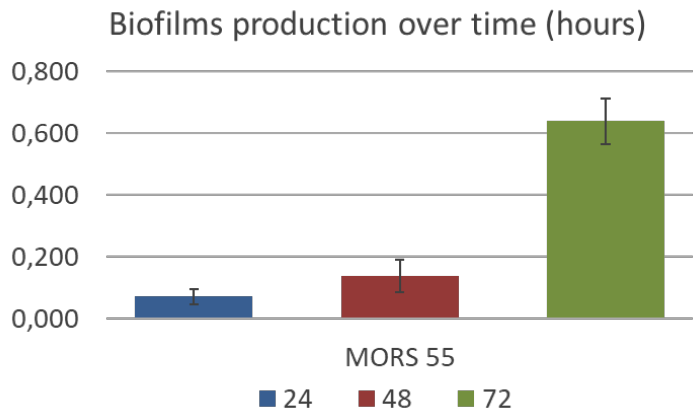
Treatment	Conditions
T5	Negative control
T6	Nitrogen and mannitol
T7	Mannitol only

Auxins production

STRAIN	Auxins (PPM)
MORS55	346,5

IAA production

STRAIN	IAA (PPB)
MORS55	852

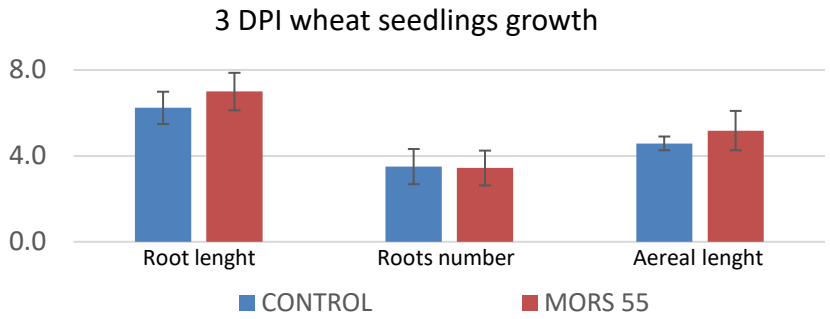


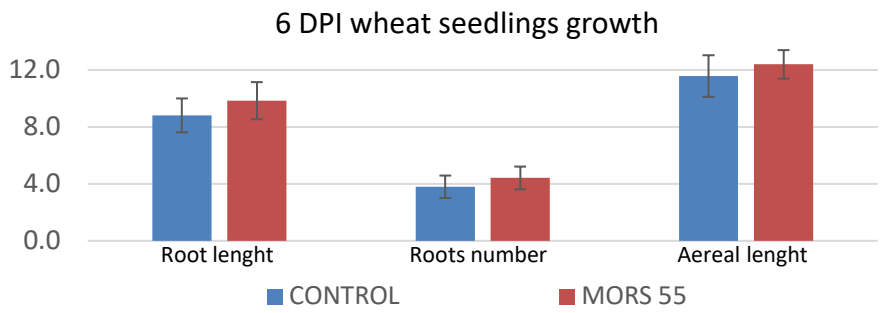
Assessment of *Bacillus megaterium* as durum wheat (*Triticum durum*) biofertilizer

Peral-Aranega, Ezequiel*; García-Fraile, Paula; Rivas, Raúl.
Department of Microbiology and Genetics. University of Salamanca.
e-mail: epa@usal.es

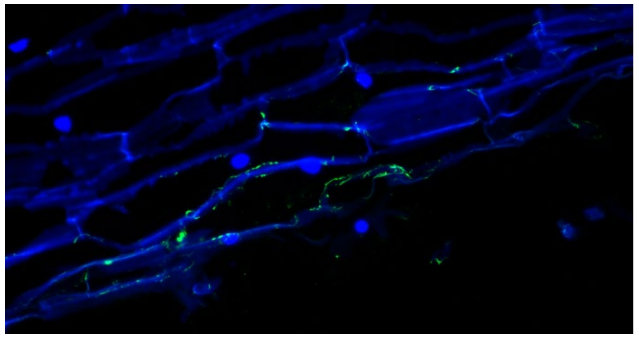
in planta assays

Influence of MORS55 strain on durum wheat seedling growth





Wheat seedlings root colonization



After 10-15 MORS 55 DPI, bacterial cellules were marked with GFP labelled anti antibodies.

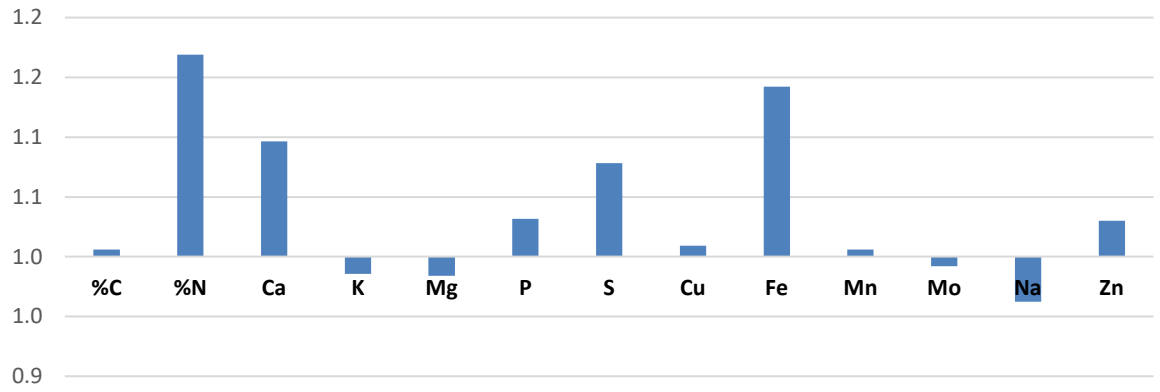
Greenhouse durum wheat production assay:

	Weight per spike (mg)	Seeds/spike (mg)
Control	768,2	576,6
MORS55	804,7	582,8

Seed quality parameters:

	apparent density g/cm3 20ºC	Raw protein (N*5.70) %	Dry gluten %	Wet Gluten %	Vitreosity % of vitreous grains
Control	0.73	12.6	8.5	26.5	82
MORS55	0.76	13.2	10.2	32.3	96

Relative to control content of macro and micro nutrients in MORS55 inoculated durum wheat seeds



Assessment of *Bacillus megaterium* as durum wheat (*Triticum durum*) biofertilizer

Peral-Aranega, Ezequiel*; García-Fraile, Paula; Rivas, Raúl.
Department of Microbiology and Genetics. University of Salamanca.
e-mail: epa@usal.es

CONCLUSIONS

- MORS55 strain, which was identified as *Bacillus megaterium* NBRC 15308^{T}, has showed *in vitro* plant-growth promoting potential.
- Among the PGP traits evaluated, biofilms production, solubilization of phosphates, and siderophores and auxins production tests were positive on these experimental conditions.
- Root colonization assays seems to indicate that the strain MORS55 is able to adhere on durum wheat roots surface.
- Greenhouse experiments on durum wheat seems to indicates that seed production and quality parameters improve when MORS55 is inoculated in comparison with water controls.
- *In planta* assays have shown that strain MORS55 has potential to be used as a biofertilizer, although field experiments are required.