## Field and greenhouse trials to study the effects of microbial inoculants on wheat performance

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Within the framework of NRP68, effects of beneficial bacteria (*Pseudomonas spp.*), entomopathogenic nematodes (EPN) and arbuscular mycorrhizal fungi (AMF) have been studied on wheat. The focus was on plant growth, performance and resistance. The experiments have been conducted in the field as well as in greenhouse.

## **Field trials**

In 2014, one winter wheat trial (WW14) and two spring wheat trials (SW14 PG, SW14 PERF) have been conducted in Prangins (VD). In each trial, different beneficial microorganisms and combinations of them have been tested.

Several parameters of wheat have been scored (Tab. 1). Plant density shows the most significant differences between the treatments.

	Inoculant				
	Root colonizing Pseudomonads		Nematodes	Mycorhiza	
	P. protegens CHAO	P. fluorescens PCL 1391	H. megidis	R. irregularis	
Overwinter survival	+	+	+	+	
Presence at anthesis	++	++	-/-	++	
Root colonization	++	++	+	+++	

**Tab 1.** Observations on the populations of the inoculants. +: Inoculant survive, no increase. ++: number of inoculants has increased. +++: number of inoculant outnumbers the natual population of the same family.



Field and greenhouse 2014 trials allowed to develop adapted methods to sow the wheat and inoculate the different beneficial microorganisms.

The inoculants persist and establish on the roots.

The first encouraging results, particularly with the greenhouse tests must still be confirm with further experiments in 2015.



Fig 1. Winter wheat 2014 (WW14) field trial at Prangins

Parameter	Pr>(F)			
Falallietei	SW14 PG	SW14 PERF	WW14	
Density	*	**	N.S.	
Height	N.S.	N.S.	N.S.	
Avarage nbr of spikelets per spike	/	/	N.S.	
Chlorophyll (N-tester)	/	N.S.	N.S.	
Brown rust (Puccinia triticina)	/	N.S.	N.S.	
Powdery mildew (Blumeria graminis)	N.S.	**	/	
Frit fly (Oscinella frit) damages	N.S.	/	/	
Thausand kernel weight	N.S.	N.S.	N.S.	
Protein content	N.S.	N.S.	N.S.	
Weight	/	*	N.S.	
			$p_{value} < 0.05$	

**Tab 2.** WW14, SW14 PG and SW14 PERF +results: effect differences between the different inoculum N.S.: non significant, \*: p-value  $\leq$  0.05, \*\*: p-value  $\leq$  0.02, /: no data

## **Greenhouse trial**

*Pseudomonas protegens* CHA0 has been inoculated in three different soil substrates to observe induce resistance of wheat to brown rust (*Puccinia triticina*).

Preliminary results show that for each of the three soil substrates the brown rust infection is less important with CHA0 compared to the control.



Fig 3. Sowing and inoculation of the winter wheat trial at the field site in Prangins.





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