CRISBA: how to combine High School education and research in Agriculture

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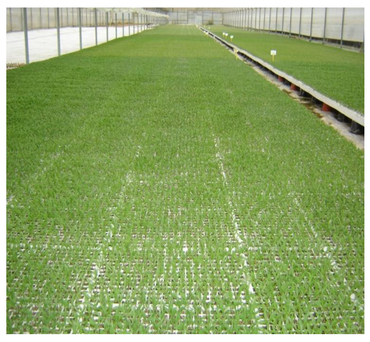
INTRODUCTION

CRISBA *(Biotechnical Instruments in Agriculture and Forestry Research Centre*) is a new research centre created in Grosseto within the High School of Agriculture "ISIS Leopoldo II di Lorena". Aims of this Centre are scientific research, experimentation and divulgation on agro-environmental issues referable to Southern Tuscany. Active projects include endangered psammophile species propagation, researches on energy crops, committed agronomical trials and researches on *Trichoderma* isolates as plants biostimulants and biopesticides. These latter, in collaboration with the Department of Agriculture, Food and Environment of the University of Pisa, are currently the main research topics of the Centre.

BIOSTIMULATION AND BIOCONTROL OF TOMATO BY *TRICHODERMA HARZIANUM* 6776

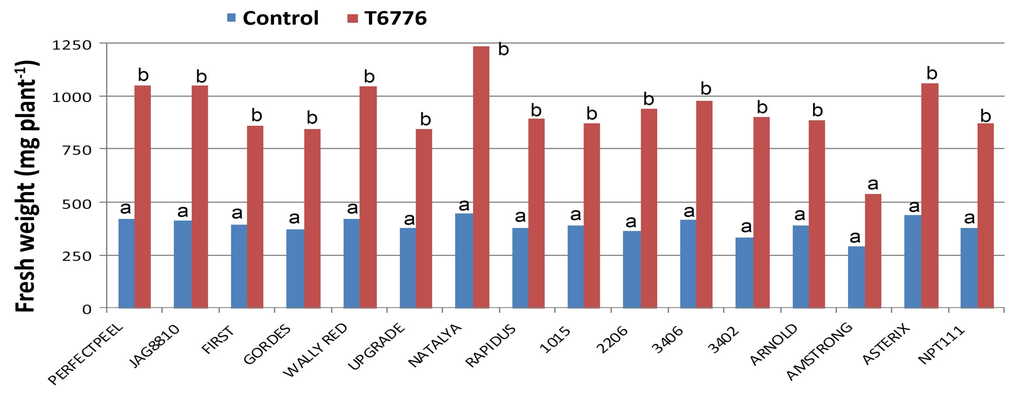


Four years experimentation allowed to demonstrate the biostimulanting activity of *Trichoderma harzianum* T6776 both in greenhouse and open field tests on tomato plants of different cultivars.

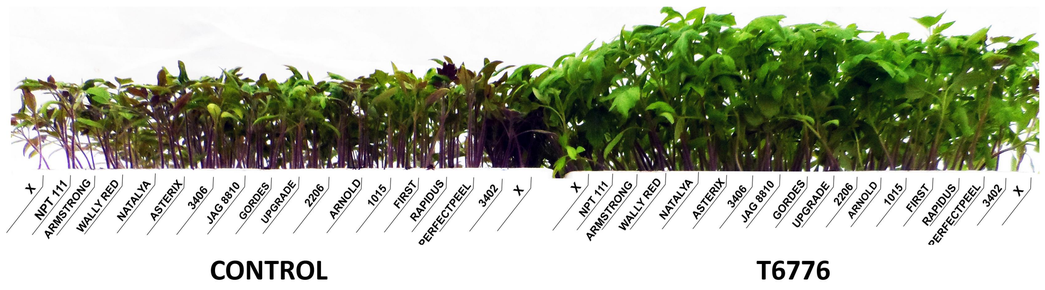
T6776 is an excellent roots endophyte and it is able to reduce plant mortality due to soil-borne plants pathogens and could be considered a new potential beneficial isolate to be employed as active ingredient in new biopesticides and biofertilizers.

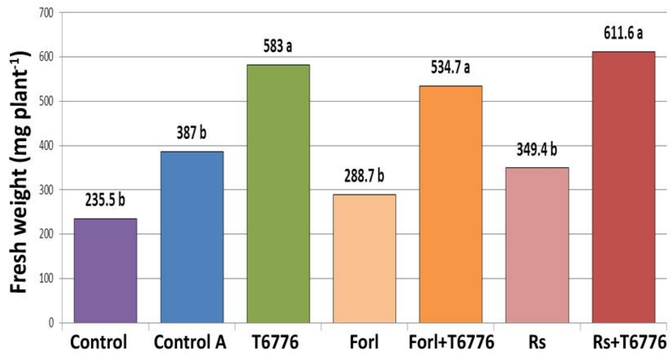
At present some tests have been done to assess the nutrient features of fruits produced by T6776 inoculated plants in collaboration with the Department of Biomedicine and Prevention, University of Rome Tor Vergata.

T6776 ON TOMATO SEEDLING ROOTS



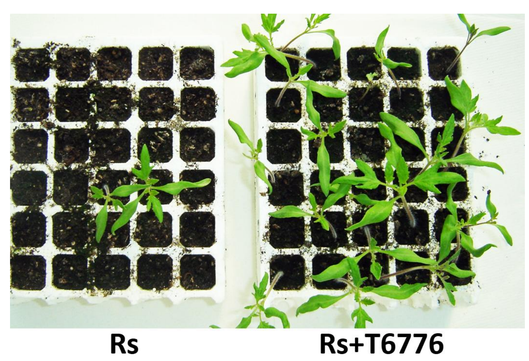
Effects of T6776 on different tomato cultivars Control: uninoculated soil; T6776: Soil inoculated with fungal biomass of *T. harzianum* 6776.





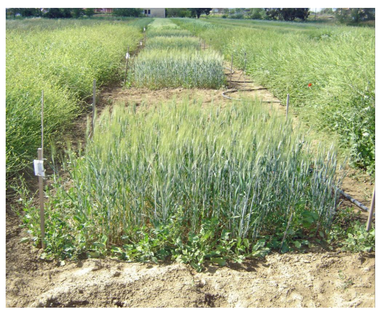
Biocontrol of *F. oxysporum* f. sp. *radicis-lycopersici* (Forl) and *R. solani* (Rs) on tomato cv *Perfectpeel*.

Control: uninoculated soil; ControlA: soil inoculated with the organic substrate without T6776; T6776: Soil inoculated with fungal biomass of *T. harzianum* 6776.



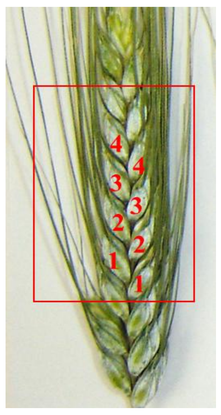
BIOLOGICAL CONTROL OF *FUSARIUM HEAD BLIGHT* UNDER FIELD CONDITIONS

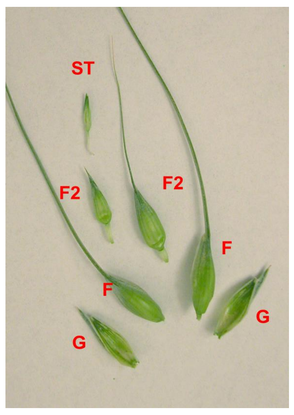
Trichoderma gamsii 6085 (T6085) was tested under field conditions in four years (2011-2014), to evaluate its ability to reduce Fusarium Head Blight (FHB) and mycotoxin accumulation in kernels. Spraying a conidial suspension of this microorganism on spikes at anthesis, a reduction of disease indexes and positive effects on productivity parameters have been recorded. Colonization of spikes and spikelet components by the antagonist was assessed. Results are encouraging and suggest that T6085 deserves further attention as a potential biocontrol agent of FHB.



Colonization of spike tissues by T6085 after 7 and 14 days from heads inoculation.	
Sources of variability	**% colonization§[1]**
Spikelet position	
1	**70.3 a**
2	**70.3 a**
3	**68.8 a**
4	**9.4 b**
Spikelet component	
F	**35.6 a**
G	**31.5 ab**
F2	**25.8 ab**
ST	**23.8 b**
Sterilization method[2]	
Entire	**70.3 a**
Separate	**39.1 b**

§average of six replicates, four spikes per replicate; [1]for each source of variability, at different letters correspond values statistically different. [2]Spikelets were surface sterilized before (Entire) or after (Separate) components separation.





8 spikelets from each spike were surface sterilised, 4 spikelets entire and 4 after separation into their components (G: 2 glumes, F: 2 basal florets, FS: 2 second level florets and ST: sterile floret) were plated on *Trichoderma* selective medium.

- Spikelets from control did not show any presence of T6085.
- Spikelets in position 4 were always less colonized by T6085.
- Sterile flowers were significantly less colonized by T6085;
- T6085 was endophytic in about 40% of spikelets components.

- Significant differences between Treatment, Growing Season and Growing season x Treatment concerning DI and DS parameters were recorded.
- T6065 caused a significant reduction of DI and DS.

Evaluation of FHB on wheat in field experiments during 2011 to 2014 growing seasons.		
Sources of variability	**DI (%)[1]§**	**DS (%)[2]§**
Treatment[4]		
CTRL	54.39 a	11.51 a
T6085	43.96 b	6.48 b
Growing Season[3]		
2011	51.58 b	15.66 a
2012	85.33 a	16.55 a
2013	54.16 b	2.67 b
2014	9.17 c	2.45 b
Treatment X Growing Season		
CTRL (2011)	65.75 b	21.11 a
T6085 (2011)	30.33 cd	7.48 bc
CTRL (2012)	84.00 a	17.97 ab
T6085 (2012)	86.67 a	15.14 ab
CTRL (2013)	56.14 b	3.11 cd
T6085 (2013)	52.18 bc	2.23 cd
CTRL (2014)	11.67 de	3.85 cd
T6085 (2014)	6.67 e	1.06 d

[1]Disease Incidence= % of infected ears; [2]Disease Severity = % of infected spikelets within each ear (*Mckinney index*); [3]average of all treatments, three replicates for each thesis; [4]average of four growing seasons, three replicates for each thesis; §at different letters, within the same column and for each source of variability, correspond values statistically different.