



BIO-INCROP WP2 & WP3: Summary of Trials 2012 – 2014

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Final BIO-INCROP Project Meeting in Ankara
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Overview greenhouse trials 2012-2014

Year	Plant material	Replanted soil	Compost	Biologically active formulates	Other treatments
2012	Seedlings Golden Delicious	Apple orchard in Wädenswil	Lignin rich, digester residues, green waste, Delinat, different ripeness stages		γ -radiation, Biochar
2012	M9 rootstocks	Apple orchard in Wädenswil	Lignin rich, digester residues, green rich, Delinat, Vermiflora, Champost	Triantum P, Rhizoplus, Chitin Forte	γ -radiation
2013	M9 rootstocks	Apple orchard in Etoy	Green waste ripe	Ekoprop, Micosat F, Mycostop, Tifi, Chitin	γ -radiation, autoclaved, ammonia fumigation, fallow soil
2014	M9 rootstocks	Apple orchard in Wädenswil	Champost ripe and unripe	Ekoprop, Micosat F, Mycostop, Tifi	autoclaved

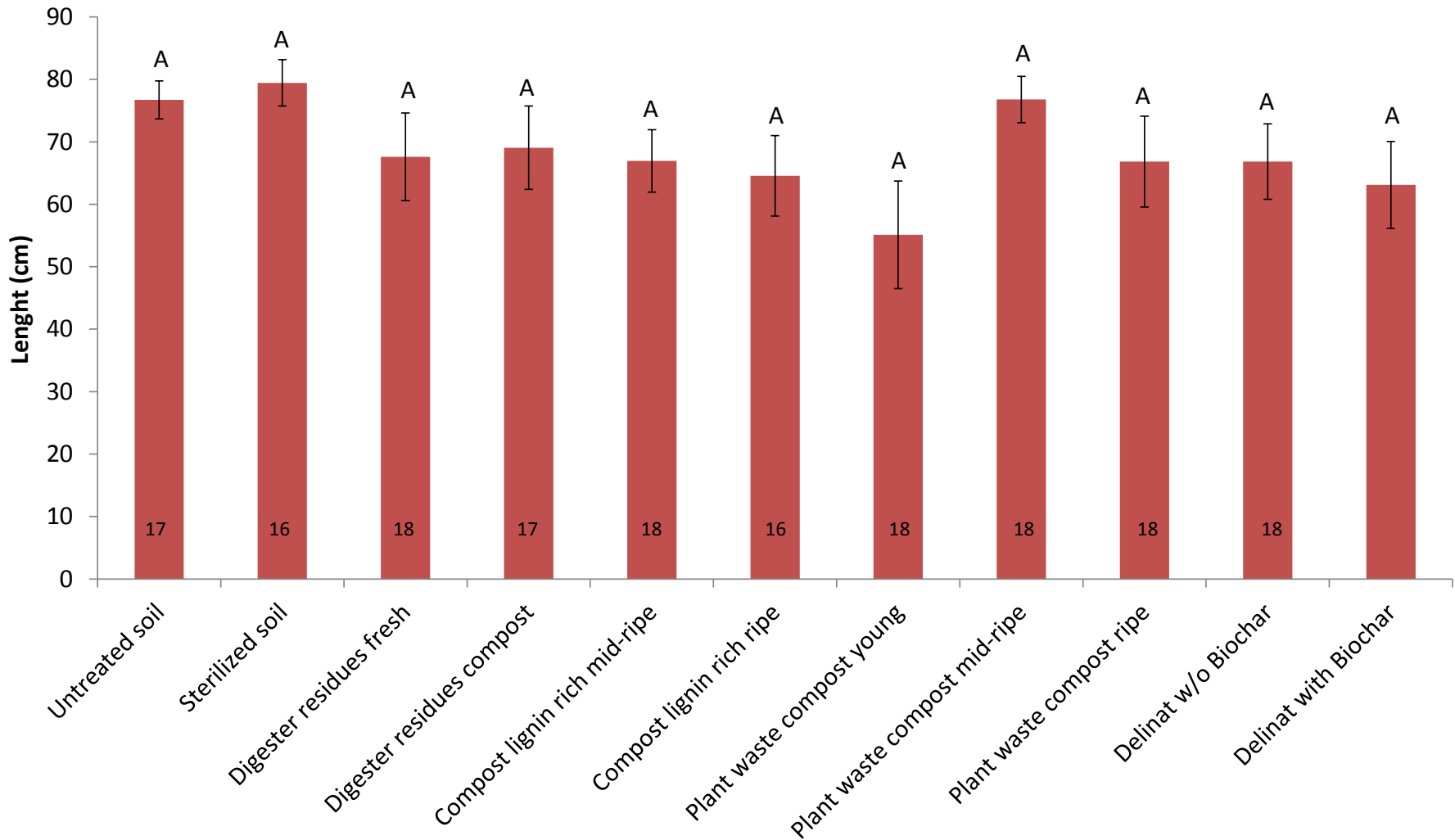


2012



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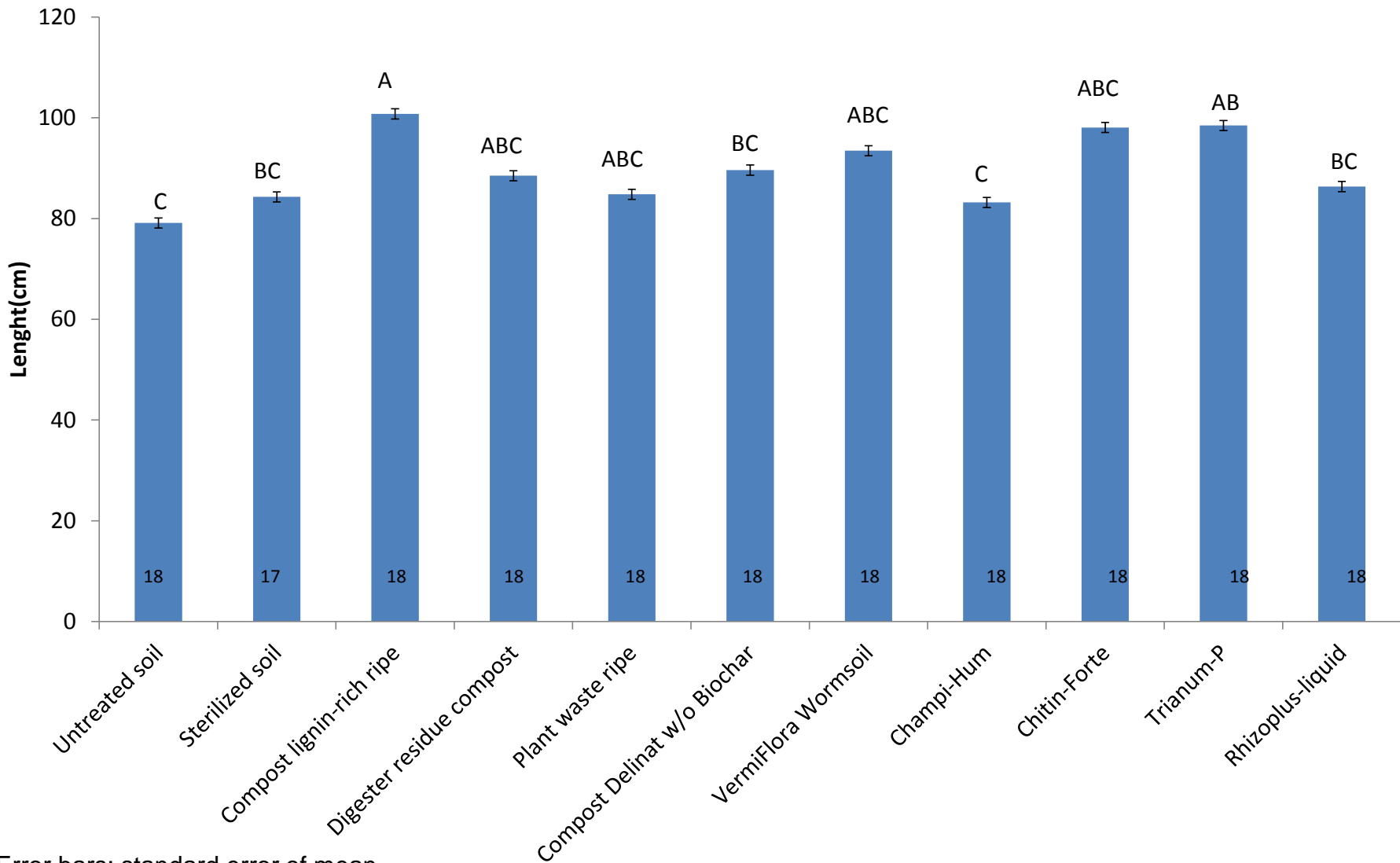
Seedlings length



Error bars: standard error of mean

Different letters indicate sign. Differences according to Fisher's LSD at 0.05.

Rootstocks lenght

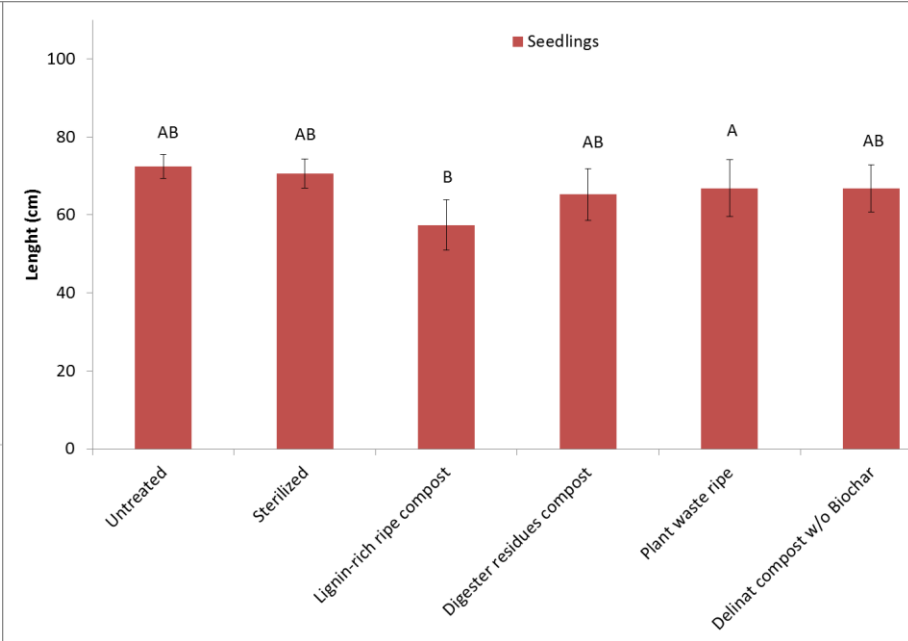
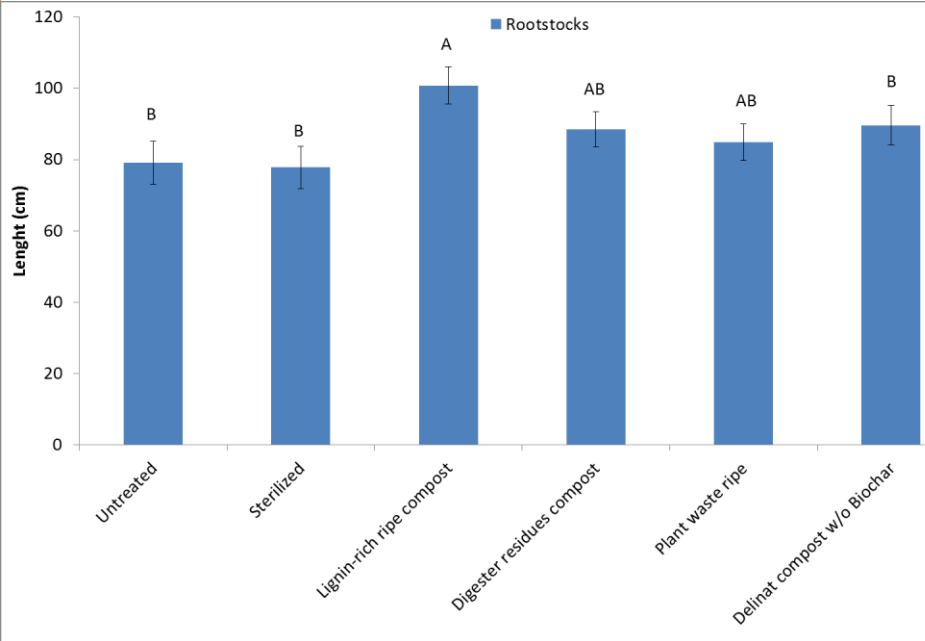


Error bars: standard error of mean

Different letters indicate sign. differences according to Fisher's LSD at 0.05.



Rootstocks vs. seedlings





2012 Conclusion

- Treatments with significantly better shoot growth compared to untreated control (rootstock trial):
 - Ripe lignin-rich compost
 - Trianum P
 - Chitin forte (shoot weight)



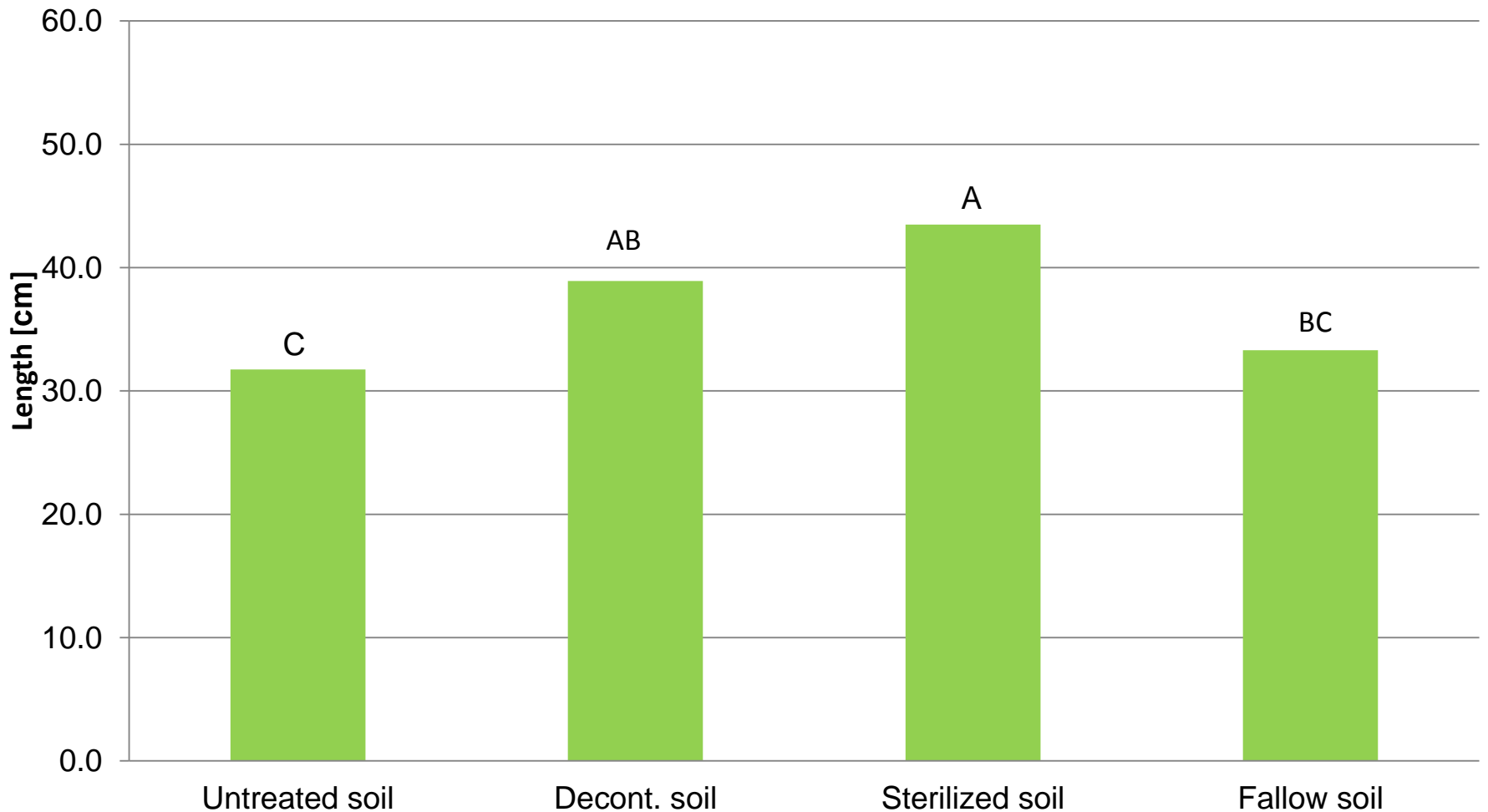
2013



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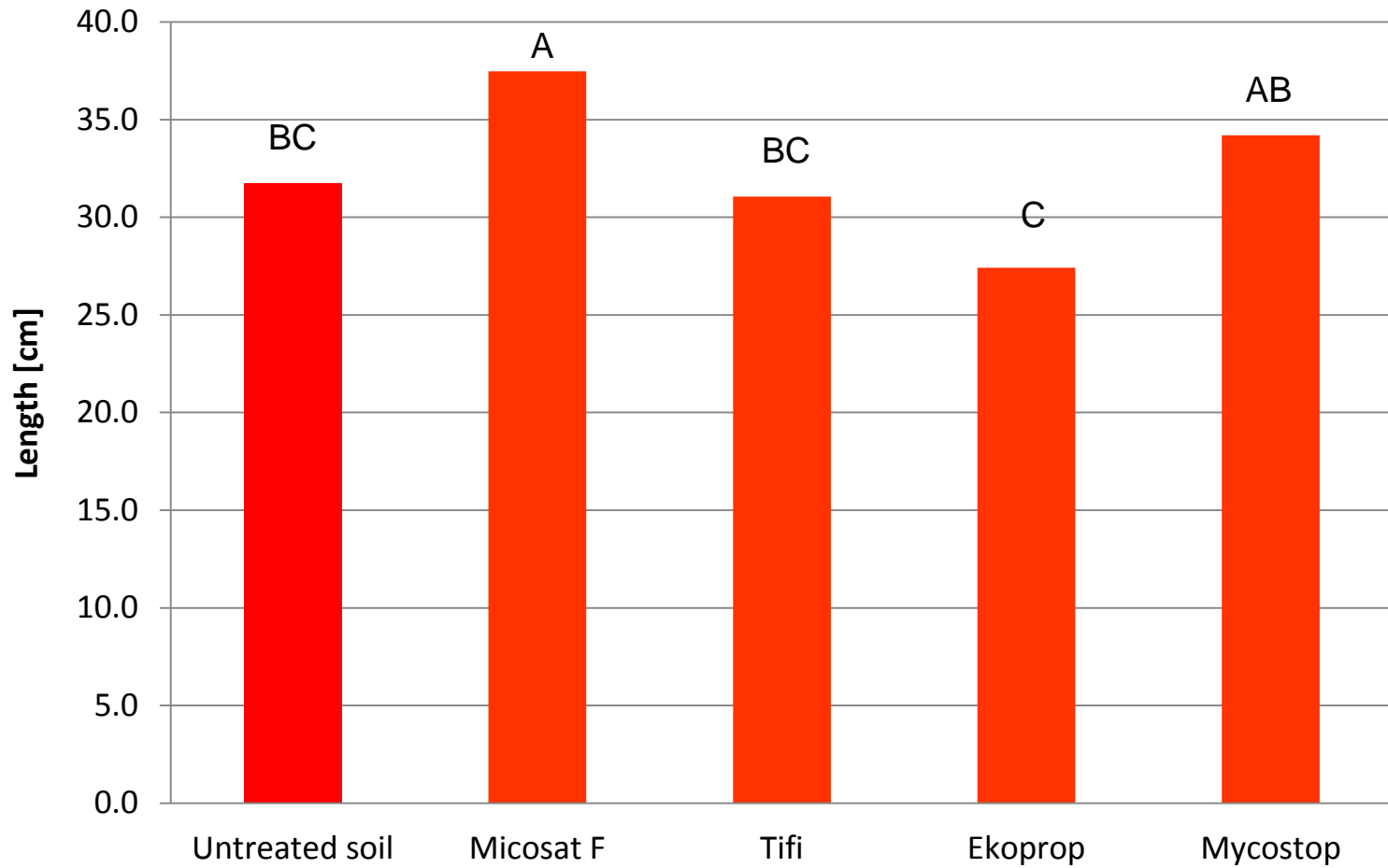
Shoot growth, control treatments



Fisher's LSD, p-value < 0.05



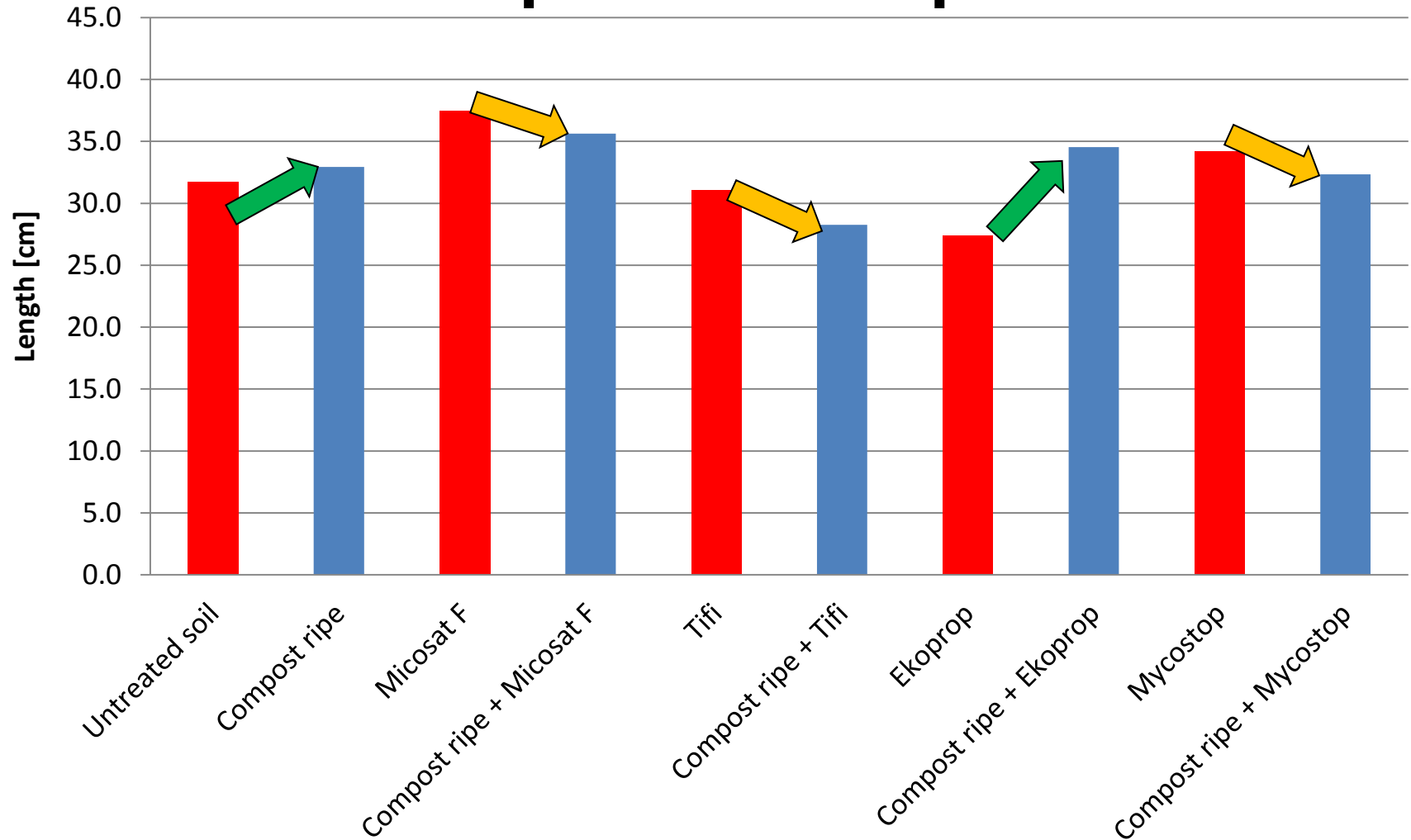
Shoot growth, «actives»



Fisher's LSD, p-value < 0.05



Shoot growth, without compost vs compost





2013 Conclusion

- Treatments with significantly better shoot growth compared to untreated soil:
 - Decontaminated soil (γ -rays)
 - Sterilized soil (autoclaved)
 - Micosat F (Mycorrhiza, saprophytic Fungi, Bacteria)
 - Chitin (soil incubated with crab shells)
- Effect of compost in addition to biological active formulate depends on product



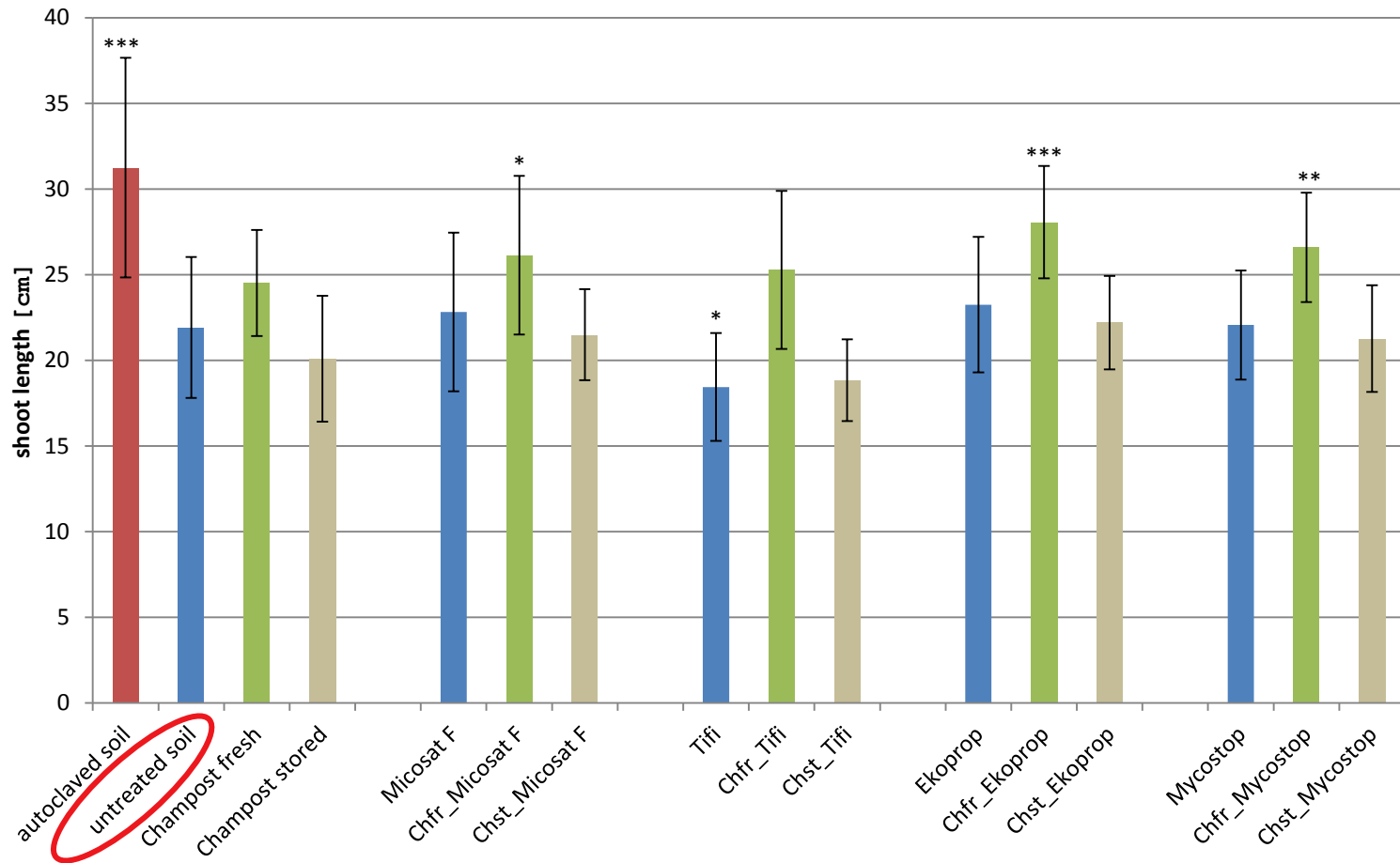
2014



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Shoot length

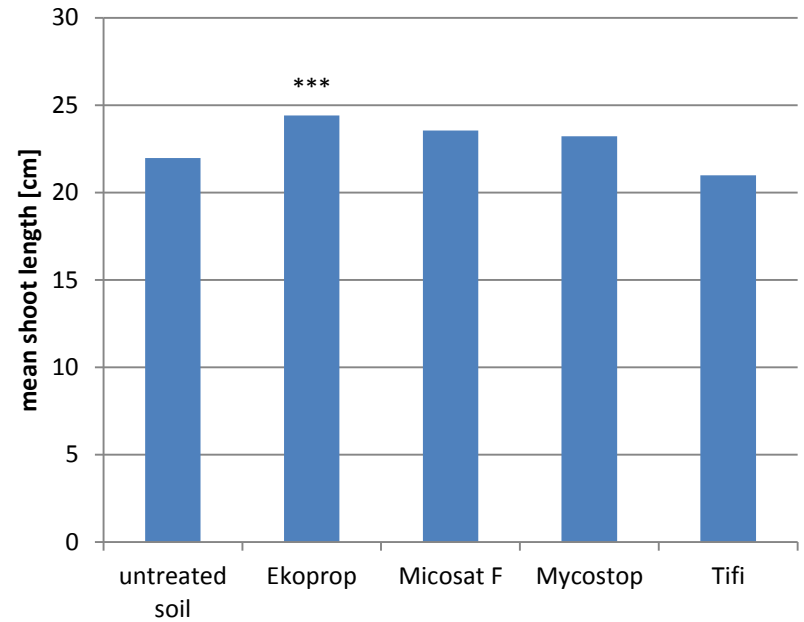
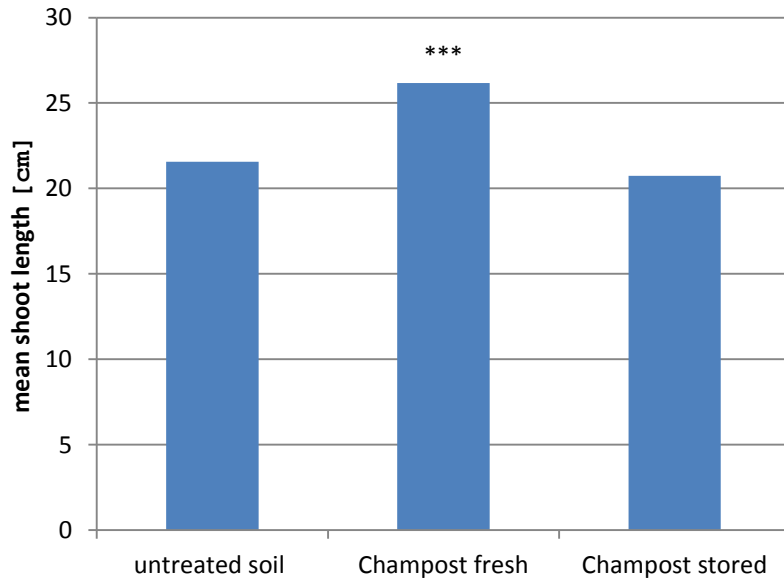


Comparison to untreated soil
ANOVA with pairwise t test with Holms correction

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$



Shoot length (2)



	Df	F value	Pr(>F)	
Compost	2	78.5	< 2e-16	***
Product	34	10.7	3.72E-08	***
Compost:Product	8	1.043	0.403	
Residuals	324			

Comparison to untreated soil
Two way ANOVA with Tukey HSD

* p<0.05
** p<0.01
*** p<0.001



2014 Conclusion

- Treatments with significantly better shoot growth compared to replanted soil:
 - Autoclaved soil
 - Champost fresh (and not Champost stored)
 - Ekoprop



Conclusion 2012-2014

- Measurement of the **length of rootstocks shoots** gave the biggest differences between the treatments

- **Composts**
 - 2012: Ripe lignin-rich compost
 - 2013: effect of compost ripe depended on biologically active compounds
 - 2014: Shoot length of Champost fresh was significantly higher (in contrast to Champost stored)

- **Biologically active formulates**
 - 2012: Trianium P, (Chitin)
 - 2013: Micosat F, Chitin
 - 2014: Ekoprop



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- J. Sempacher (Bachelor student)
- J. Krauss and team (Responsible for greenhouse trials)

- A. Naef (Project leader)





Thank you for your attention



Agroscope good food, healthy environment

2012 Trial with M9 rootstocks

#	Treatment	Description	g (dry) / l
*1	Control	replanted soil	-
*2	Decont. Control	soil radiated with 25 kGy	-
*3	Compost-lignin rich	green waste, wood, ripe	8.3
*4	Compost-digester	residues from biogas production	8.3
*5	Compost-plant, ripe	green waste, ripe	8.3
*6	Compost-Delinat	green material, straw, manure	8.3
7	VermiFlora-worm soil	manure, green waste, rock meal	8.3
8	Champi-Hum	horse & chicken manure, gypsum	8.3
9	ChitinForte	Crab shells	1.0
10	Trianum-P	<i>Trichoderma harzianum</i>	50 ml / pot
11	Rhizoplus liquid	<i>Bacillus amyloliquefaciens</i>	30 ml / pot

*: treatments 1 – 6: were included in trial 1 and trial 2



2012 trial 2 with seedlings

#	Treatment	Description	g (dry) / l
*1	Control	replanted soil	-
*2	Decont. Control	soil radiated with 25 kGy	-
*3	Compost-lignin rich	green waste, wood, ripe	8.3
*4	Compost-digester res.	residues from biogas production	8.3
*5	Compost-green waste	green waste, ripe	8.3
*6	Compost-Delinat	green material, straw, manure	8.3
7	Compost –l.r. mid. ripe	<i>Compost lignin rich, younger</i>	8.3
8	Digester residue	fresh residues from biogas prod.	8.3
9	Compost-g.w. young	<i>Compost green waste, 2.5 weeks</i>	8.3
10	Compost-g.w. mid. ripe	<i>Compost green waste, 6 weeks</i>	8.3
11	Compost-D. + biochar	<i>Compost Delinat with biochar</i>	8.3

*: treatments 1 - 6 were included in trial 1 and 2

2013

#	Treatment	Description
1	Untreated soil	Replanted orchard soil
2	Decontaminated soil	1 sterilized with γ -Rays 25 kGy
3	Sterilized soil	1 autoclaved (15 min at 121°C)
4	Fallow soil	orchard soil, no fruit trees for 10 years
5	Compost ripe	1 with compost (8.3g/L soil, Haab-Bossert)
6	Compost ripe + Micosat F	1 with compost (5) and micro-organisms (7)
7	Micosat F	1 with micro-organisms (10g Micosat F/L soil: Mycorrhiza, saprophytic Fungi, Bacteria)
8	Compost ripe + Tifi	1 with compost (5) and micro-organisms(9)
9	Tifi	1 with micro-organisms (5.3g Tifi/L soil: Glomus spp., Trichoderma atroviride, Bacteria and organic material)
10	Compost ripe + Ekoprop	1 with compost (5) and micro-organisms (11)
11	Ekoprop	1 with micro-organisms (0.25g Ekoprop/L soil: Glomus spp., Pseudomonas spp., Bacillus spp. and specific Fungi as antagonist)
12	Compost ripe + Mycostop	1 with compost (5) and micro-organisms (13)
13	Mycostop, 0.013g/L soil	1 with micro-organisms (0.013g Mycostop/L soil: Streptomyces griseoviridis)
15	Ammonia-Fumigation	1 pretreated with 0.108g urea/L soil and 0.108g sugar/L soil
17	Chitin	1 pretreated with 1.35g crab shells/L soil
16	Compost unripe	1 with compost (8.3g/L soil, Leureko)
14	Soil Sandhof	Soil derived from a vegetable field, (Sandhof, Wädenswil)
18	Soil Sandhof + compost unripe	14 with compost (16)



2014 Material and Methods

Treatments	Description
Autoclaved replanted soil	15 min at 121°C
Untreated replanted soil	from an apple orchard in Wädenswil
Champost fresh	33 g /L soil, Champi Hum
Champost stored	33 g /L soil, Champi Hum
Micosat F	33 g/L soil: mycorrhiza, saprophytic fungi, bacteria
Champost fresh and Micosat F	
Champost stored and Micosat F	
Tifi	1.3 g/L soil: <i>Glomus</i> spp., <i>Trichoderma atroviride</i> , bacteria and organic material
Champost fresh and Tifi	
Champost stored and Tifi	
Ekoprop	1.5 g/L soil: <i>Glomus</i> spp., <i>Pseudomonas</i> spp., <i>Bacillus</i> spp. and specific fungi as antagonists
Champost fresh and Ekoprop	
Champost stored and Ekoprop	
Mycostop	2 g/L soil: <i>Streptomyces griseoviridis</i>
Champost fresh and Mycostop	
Champost stored and Mycostop	



2013 Shoot length

