properties and soil fertility in an organic peach orchard

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introduction

In organic orchard, **tillage methods** used to control weeds in the tree row have some **drawbacks** :

→ these methods are **time-consuming** and associated with a **use of non-renewable energy**,

→ tillage **interferes with the development of superficial roots** and can hurt the trunk,

→ the physical, chemical and biological **properties of the soil can be disturbed**; **erosion and runoff can potentially increase**.

The **cover crops** could be an interesting alternative to control weeds in the tree row of **conventional and organic orchards**.

This poster presents the effect of such alternative techniques on soil fertility and agronomic properties.

experimental plot design

Benedicte cultivar planted in 1999 – density 4x5m – sandy/loam soil
38 trees split in 4 repetitions / treatments – 2 treatments.

Tillage treatment (T)

Weed control : 5-7 tillage operations / year with Ommas (disc tool). Tillage depth = 15cm.
Nitrogen supply : 75 Kg.ha^{-1} in two applications in 2008/2009.

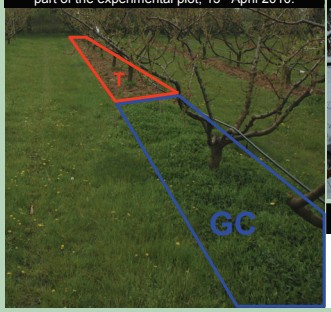
Ground cover treatment (GC)

Weed control : White Clover (*Trifolium repens* Cv Huia) was sawed in 2004, 2006, 2009 in the tree row and ploughed in 2006 and 2008.
Nitrogen supply : 38 Kg.ha^{-1} of nitrogen supplied in two applications in 2008/2009.

All cropping practices except soil management in the row and nitrogen supply are the same for T and GC treatments.

Since 2005, total nitrogen supplies are twice less in GC than in T treatment. Water supply was realised with microjet and drived by tensiometer (threshold : 50cb).

Ground cover (GC) and tillage (T) treatments in a part of the experimental plot, 13th April 2010.



Manual sampling and sorting of earthworms in a 40x40cm area and 20cm depth, 5th January 2010.

Ecological earthworms groups.

Simplified Beerkan test. Cumulative time for water infiltration is measured through a cylinder (30cm diameter).

results & discussion

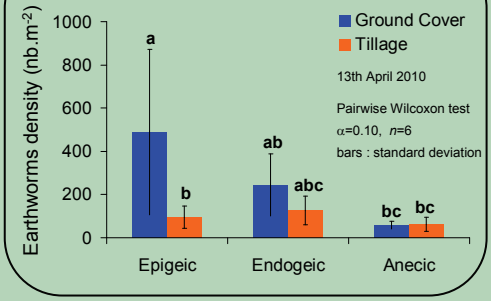
Earthworm density and biomass 2010

	number.m^{-2}		g.m^{-2}	
	GC	T	GC	T
5th January	375±188^{abc}	220±26^{abc}	209±85^{a}	159±50^{a}
13th April	792±525^{a}	285±116^{ab}	362±211^{a}	235±73^{a}
20th May	173±65^{b}	30±22^{c}	79±26^{b}	29±24^{c}

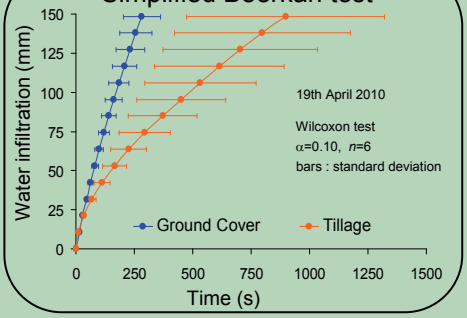
Pairwise Wilcoxon test with Bonferroni correction, α=0.10, n= 4 to 6

→ **Earthworm density and biomass variations observed in 2010 are high during winter and spring periods**.

Earthworm density & ecological group



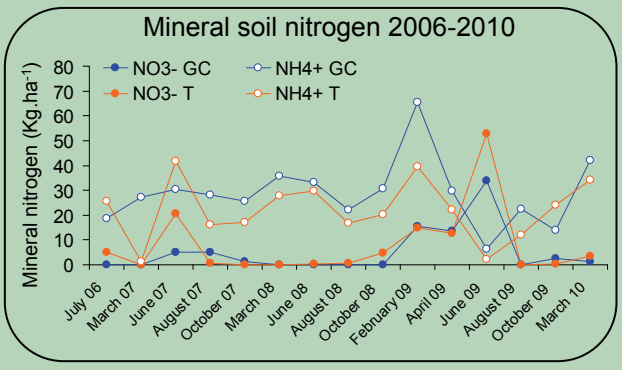
Simplified Beerkan test



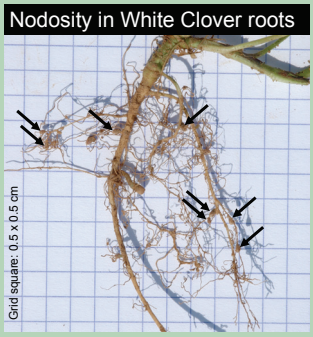
→Water infiltration is assumed to be positively influenced by porosity, including earthworm macropores. In particular, Anecic earthworms make large and vertical burrows compared to endogeic and epigeic earthworms. For the three sampling dates in 2010 (January, April and May) **water infiltration rate for GC treatment was significantly higher** than for T treatment but **no significant difference was observed for Anecic earthworms between GC and T**.

→Difference observed in water infiltration rate could be explained by the thick superficial root mat which is associated to a high Epigeic density in GC treatment.

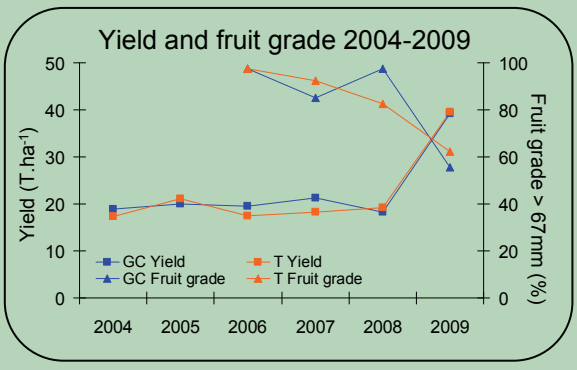
Mineral soil nitrogen 2006-2010



Nodosity in White Clover roots



Yield and fruit grade 2004-2009



→The ammoniacal form prevailed in the mineral soil nitrogen of GC and T treatments. Ammoniacal form increase in spring can be related to organic supplies. Summer nitrification observed varies according to soil conditions. **Whereas nitrogen supplies are twice lower in GC treatement since 2005, soil nitrogen availability is equivalent in both treatments.**

→Fabaceous ground cover is an efficient nitrogen source in such condition.

→ Yield and fruit grade are equivalent in both treatments. **No negative effect of GC treatment was observed during 2004-2009 period on yield and fruit grade. Moreover, *Monilia* damages, which are one of the most serious damages observed in organic peach orchards, were reduced under GC treatment (Gomez and Mercier, 2008).**

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