



# AGRI-KNOWS

Knowledge transfer in agriculture as  
an added value in protecting the  
environment

## ISIS MALIGNANI CERVIGNANO DEL FRIULI INTERMEDIATE REPORT

Technical Day  
Nova Gorica, 28/02/2014



2007-2013

cooperazione territoriale europea  
programma per la cooperazione  
transfrontaliera

Italia-Slovenia

evropsko teritorialno sodelovanje  
program čezmejnega sodelovanja

Slovenija-Italija



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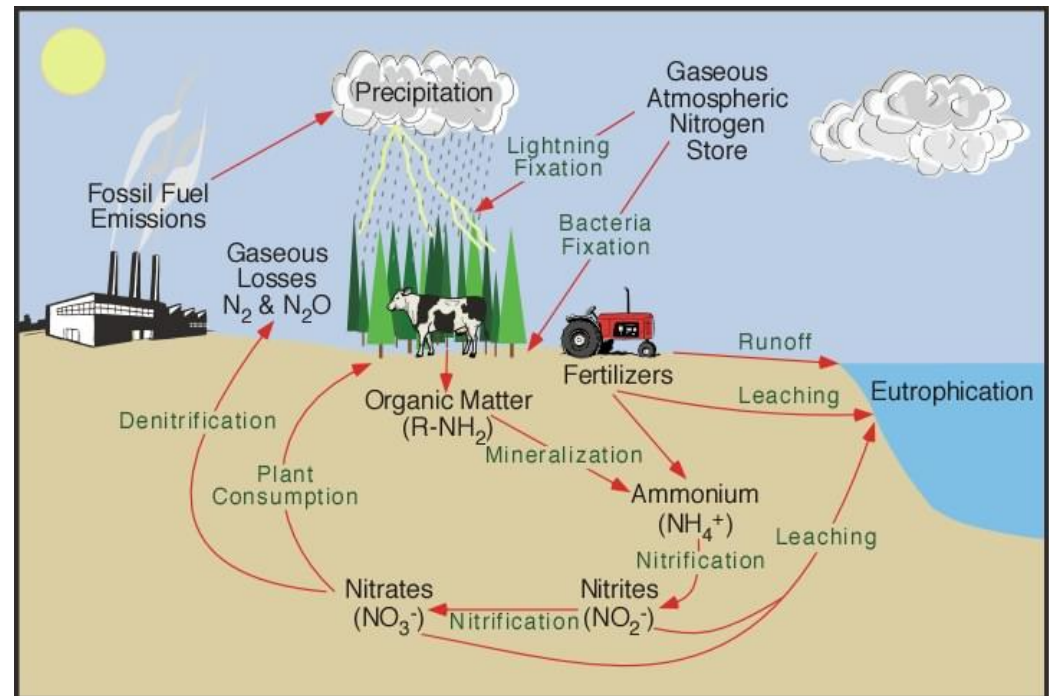
Projekt sofinancira Evropski sklad  
za regionalni razvoj

# Microcosmos experimental trials NITROGEN

- ▶ YEAR 2013 – Part one
- ▶ Study of the behaviour of N coming from fertilizers added in different oxidation states

Analysis of  
 $\text{NH}_4^+$  Ammonium  
 $\text{NO}_2^-$  Nitrites  
 $\text{NO}_3^-$  Nitrates

- ▶ Two types of soils



# NITROGEN experiments

## Soil characterization

Soil	pH	Texture	Limestone (CaCO <sub>3</sub> %)	Cationic exchange capacity (cmol/kg)	Organic carbon C %
Fossalon	7,8	Clay-loam	48,8	31,4	3,0
Cervignano	7,4	Clay-loam	17,1	23,8	2,5

# Experimental part - Summer stage

**350 Kg/ha** of Nitrogen added

Thesis 1:  **$\text{Ca}(\text{NO}_3)_2$**  added

Thesis 2:  **$(\text{NH}_4)_2\text{SO}_4 + \text{NH}_4\text{NO}_3$**  added

Thesis 3: **Control (blank)**

Six elutions with 350 mL water  
(equivalent to **50 mm** of rain)  
from 06/06/2013  
to 11/07/2013

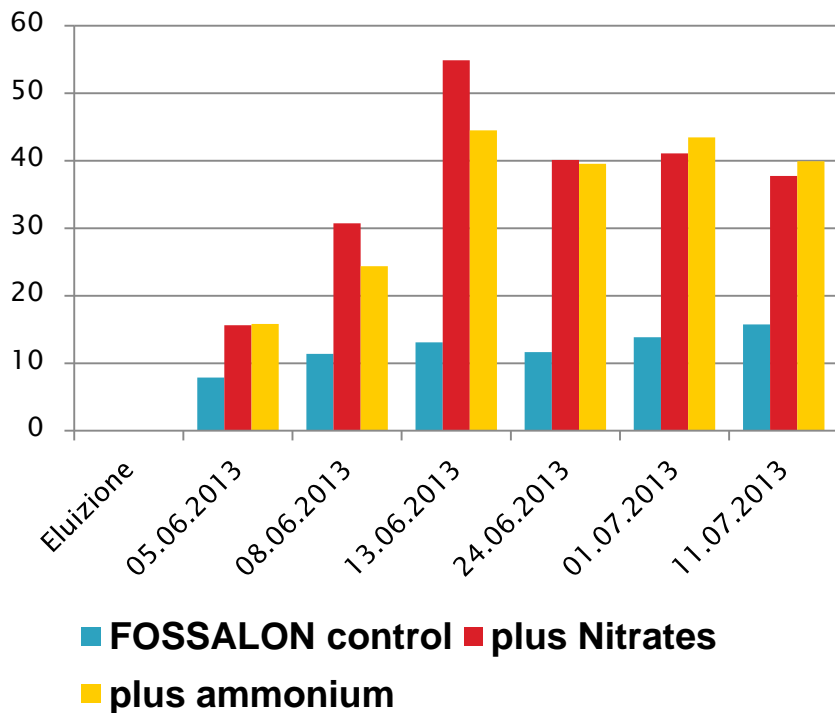
The percolates have been  
collected, measured in volume  
and analyzed for  $\text{NH}_4 - \text{NO}_2 - \text{NO}_3$



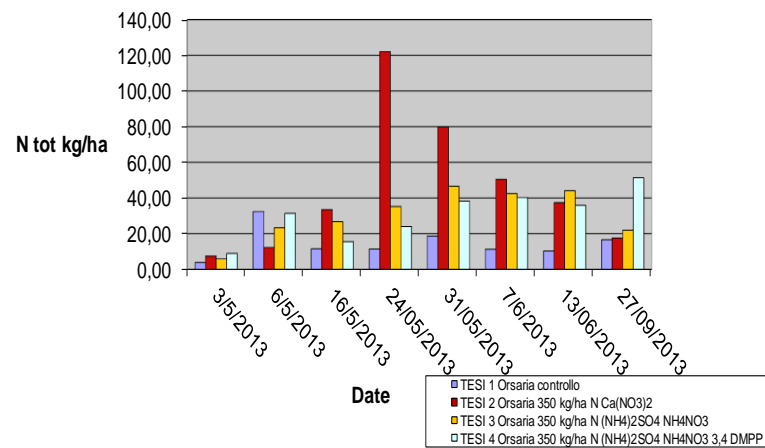
# Results

## FOSSALON SOIL

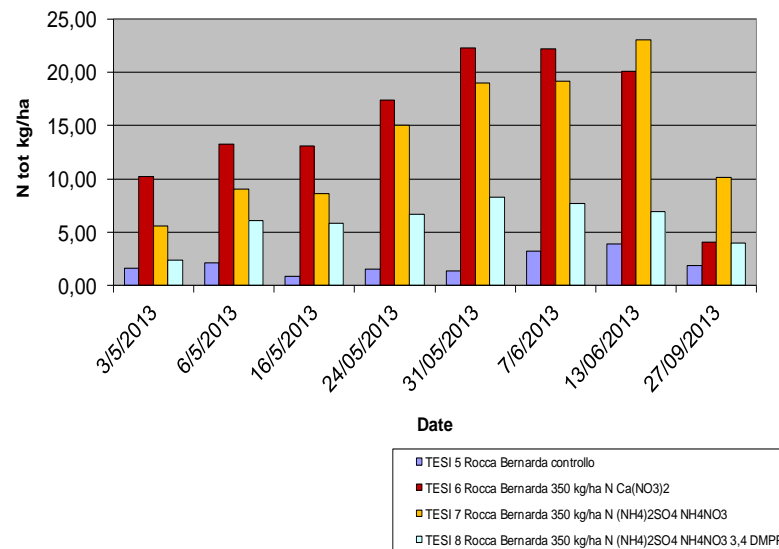
TOTAL N as Kg N/ha ( $\text{NH}_4 + \text{NO}_2 + \text{NO}_3$ )



Terreno Orsaria - Azoto totale dilavato ( $\text{NH}_4^+$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ )



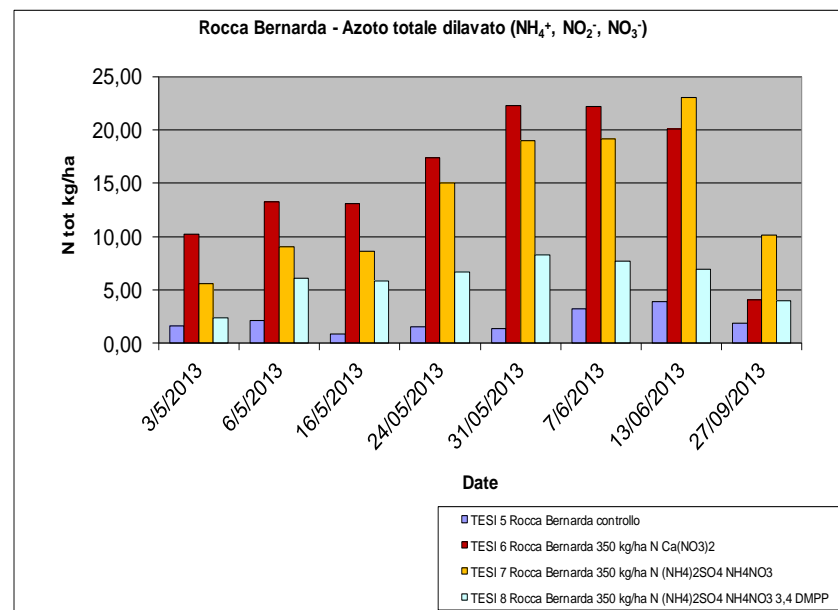
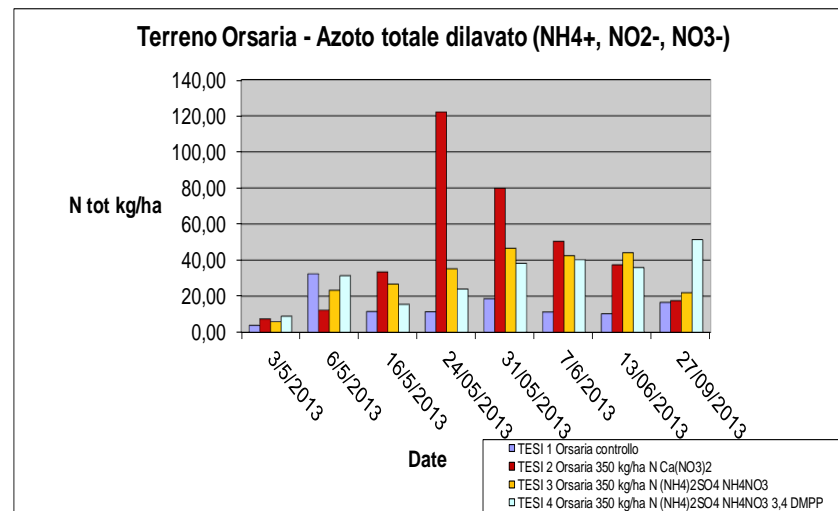
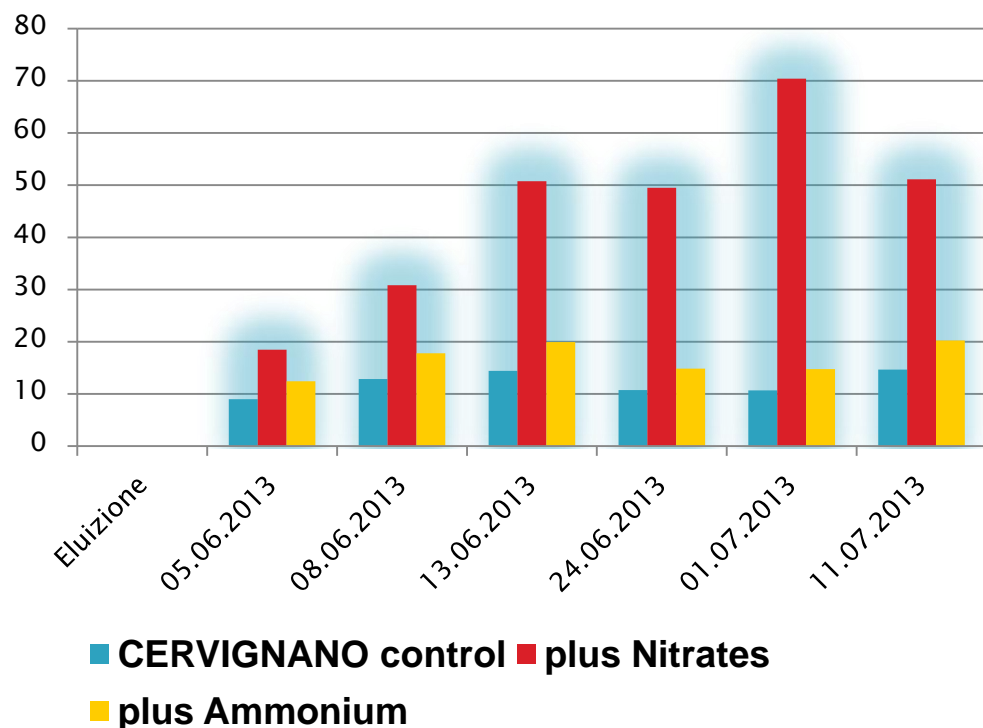
Rocca Bernarda - Azoto totale dilavato ( $\text{NH}_4^+$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ )



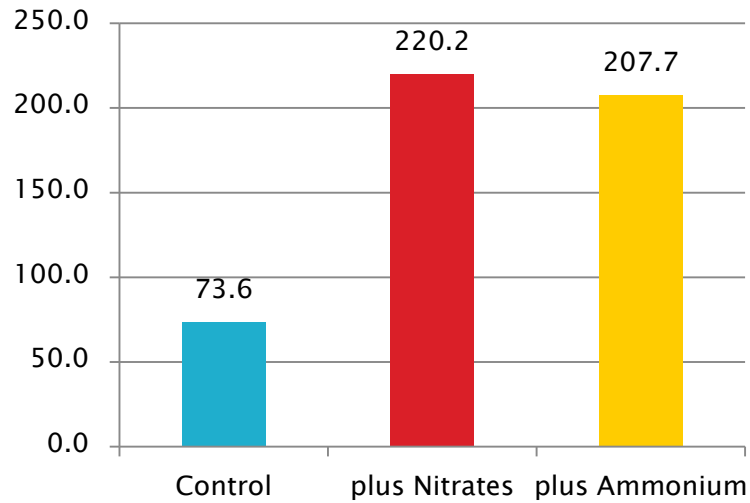
# Results

## CERVIGNANO SOIL

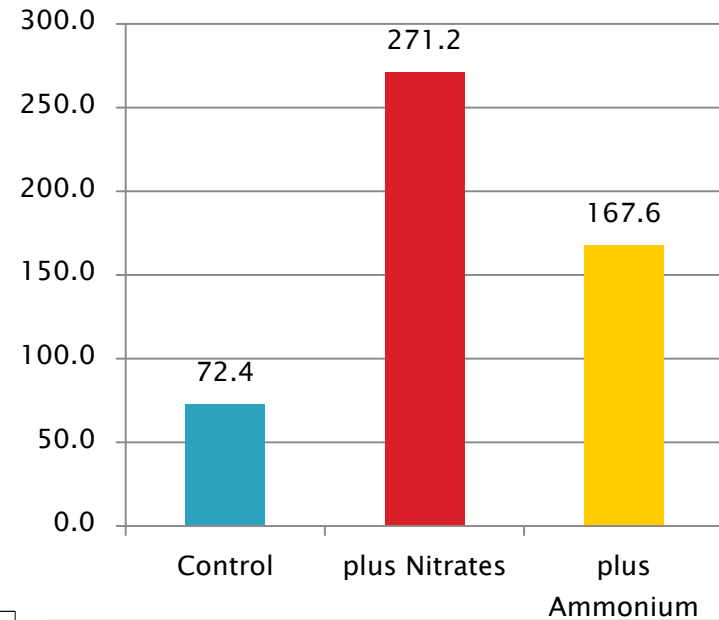
TOTAL N as Kg N/ha ( $\text{NH}_4 + \text{NO}_2 + \text{NO}_3$ )



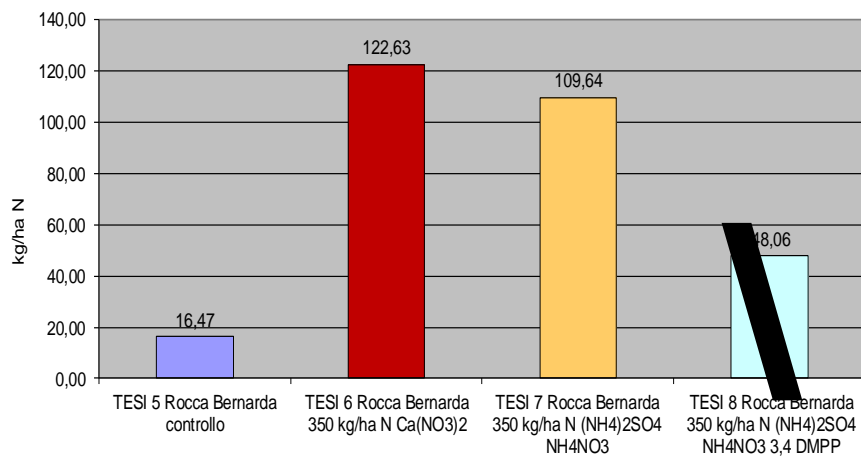
## Kg N/ha Fossalon soil



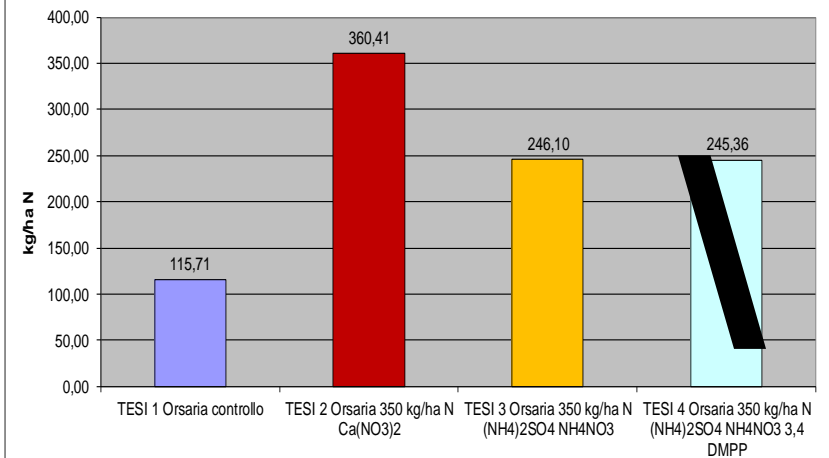
## Kg N/ha Cervignano soil



Terreno Rocca Bernarda - azoto totale dilavato kg/ha



Terreno Orsaria - azoto totale dilavato kg/ha

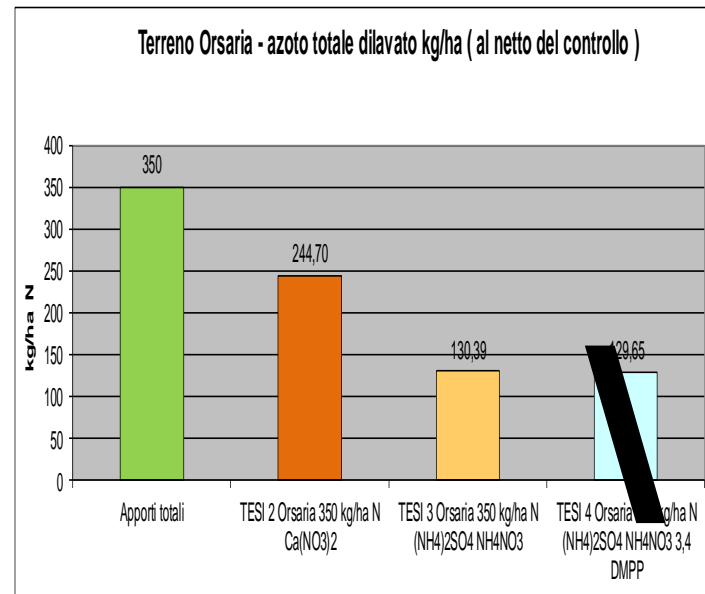
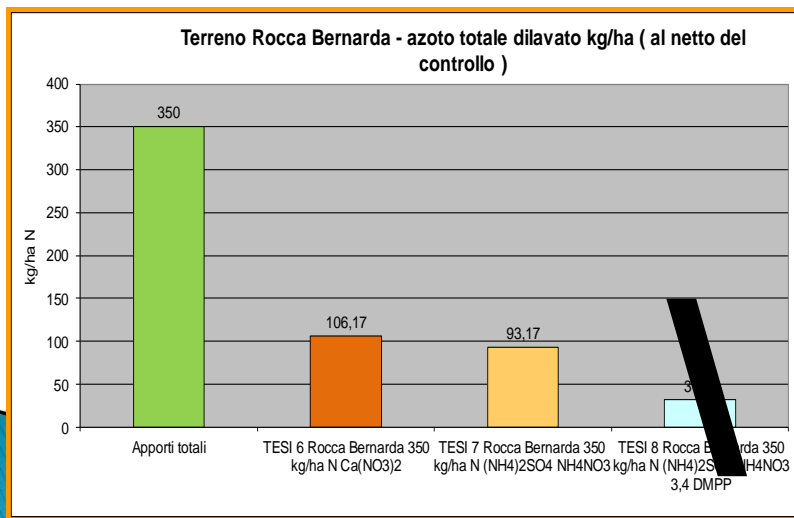
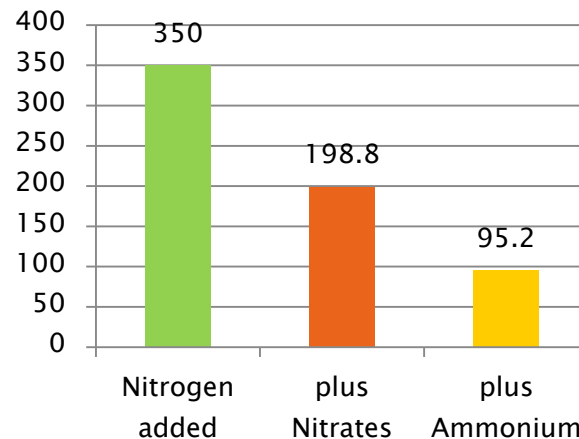
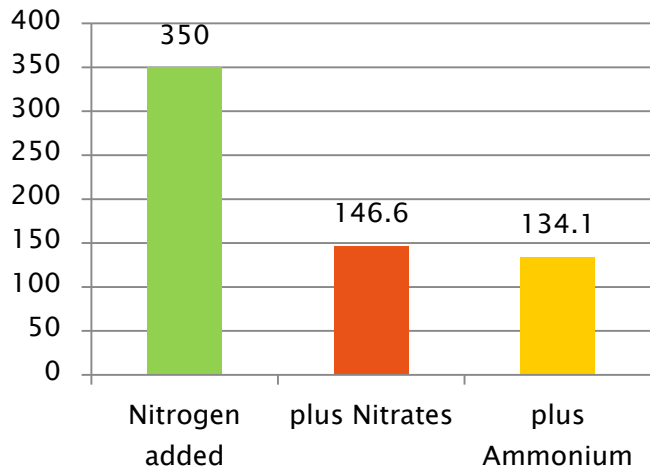


# Conclusions

## FOSSALON soil

## TOTAL N as Kg N/ha

## CERVIGNANO SOIL





# Microcosmos experimental trials - CHROMIUM

- ▶ **YEAR 2013 – Part two**
- ▶ **Study of the behaviour of Chromium in soils**
  - **added as pure salt of Cr(III) or Cr(VI)**
  - **when coming from industrial sludges used as fertilizers i.e. compost from tanneries – Cr(III)**

**Different oxidation states/different behaviour in soil**

**Cr(III) is a cation  $\text{Cr}^{3+}$**

**Cr(VI) is an anion  $\text{CrO}_4^{2-}$**

# Experimental part - Summer stage



**Thesis 1 -  $\text{Cr}(\text{NO}_3)_3$  added  
1600 mg/Kg of Cr(III)**

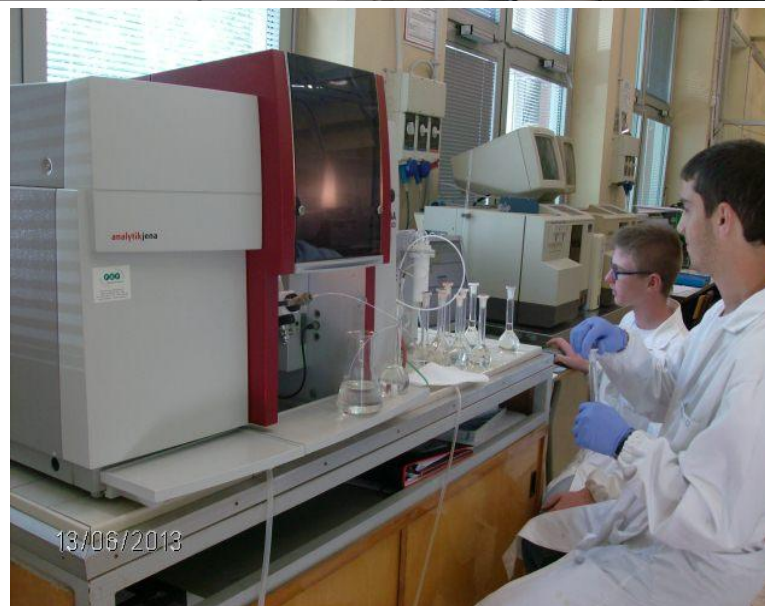
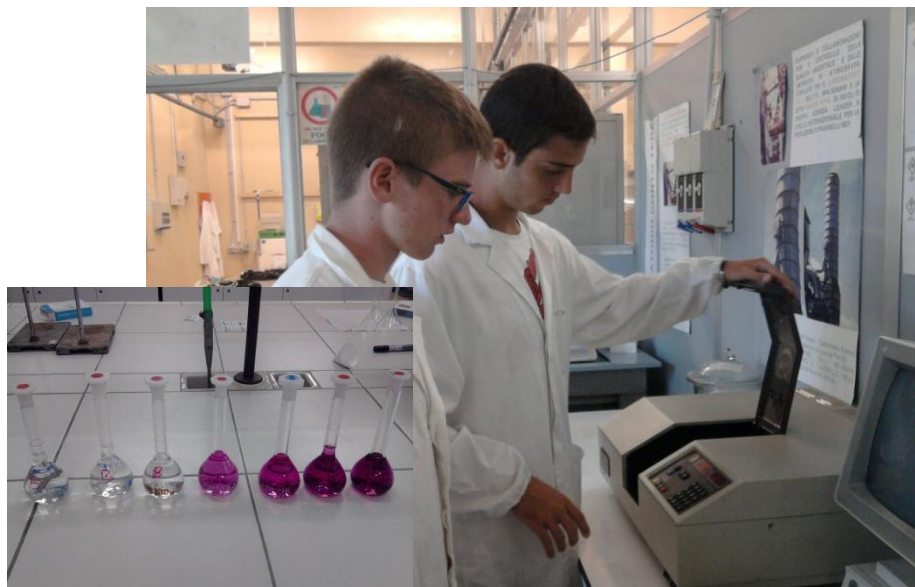
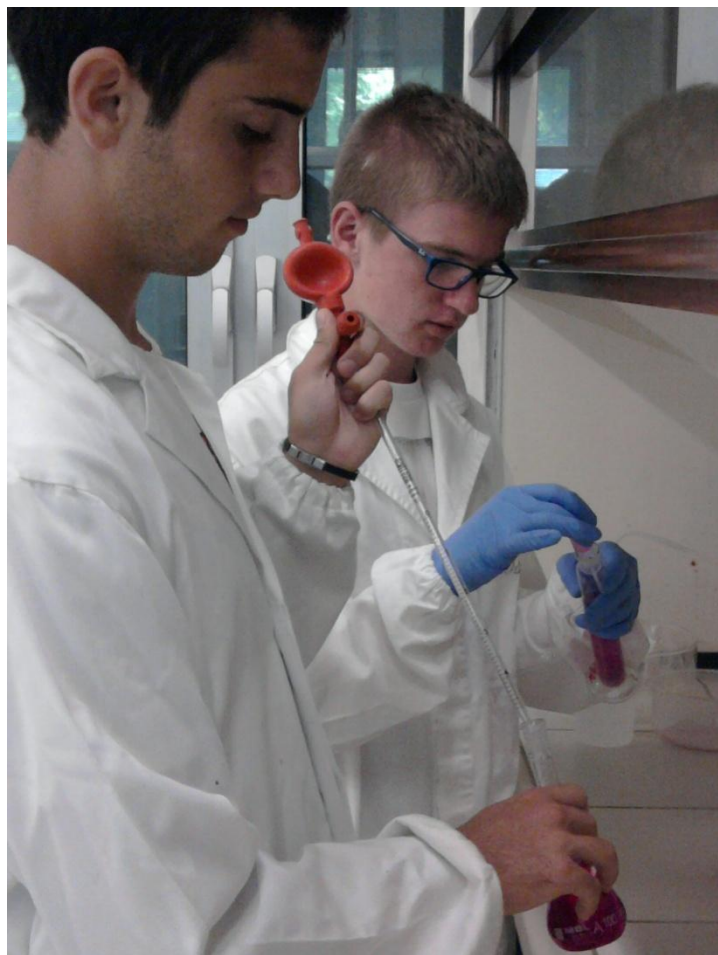
**Thesis 2 - Tannery sludge  
added  
1600 mg/Kg of Cr(III)**

**Thesis 3 -  $\text{K}_2\text{CrO}_4$  added  
500 mg/Kg of Cr(VI)  
+ Control (blank)**

**Six elutions with 350 mL  
water (50 mm of rain)  
from 06/06/2013  
to 11/07/2013**

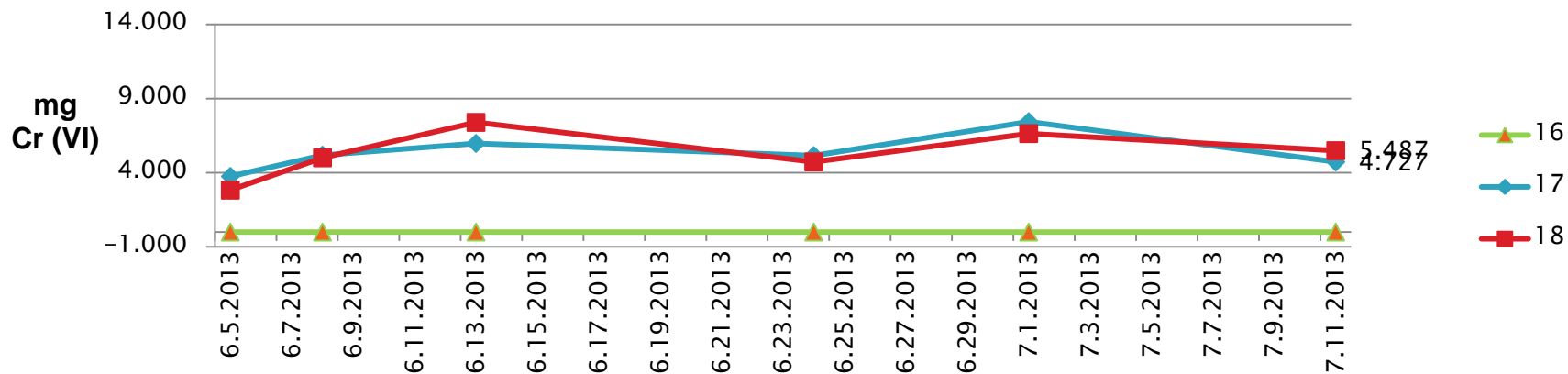
**Experiments in double**

# Chromium experiments

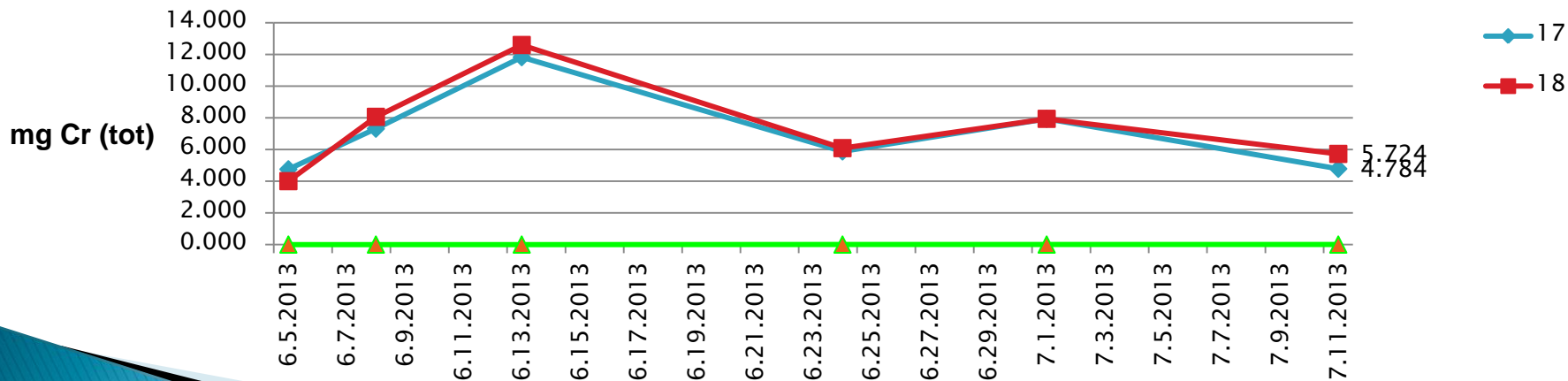


# First results (I)

## Cr (VI) leaching from soil with Cr(VI) added

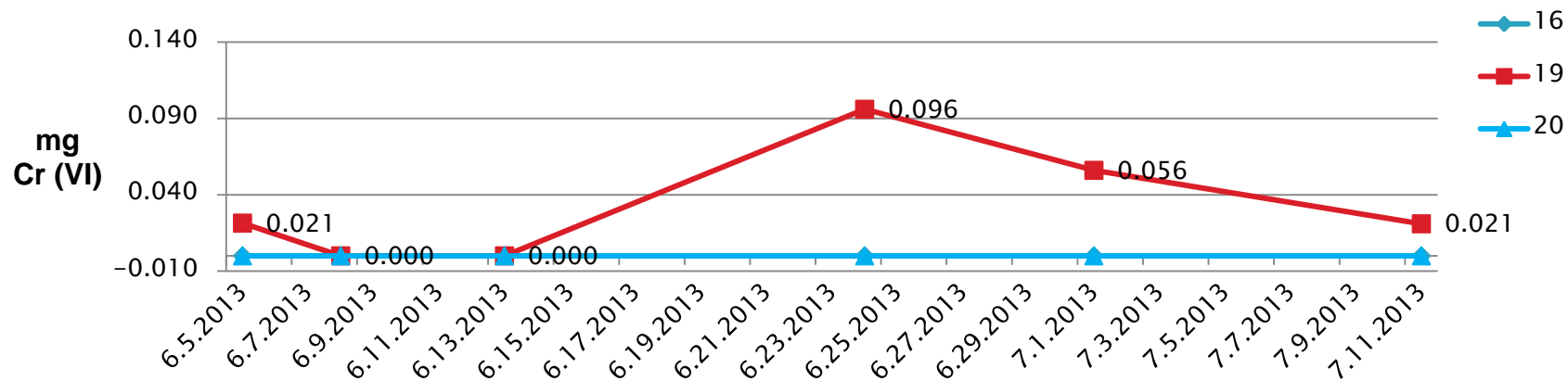


## Cr (tot) leaching from soil with Cr(VI) added

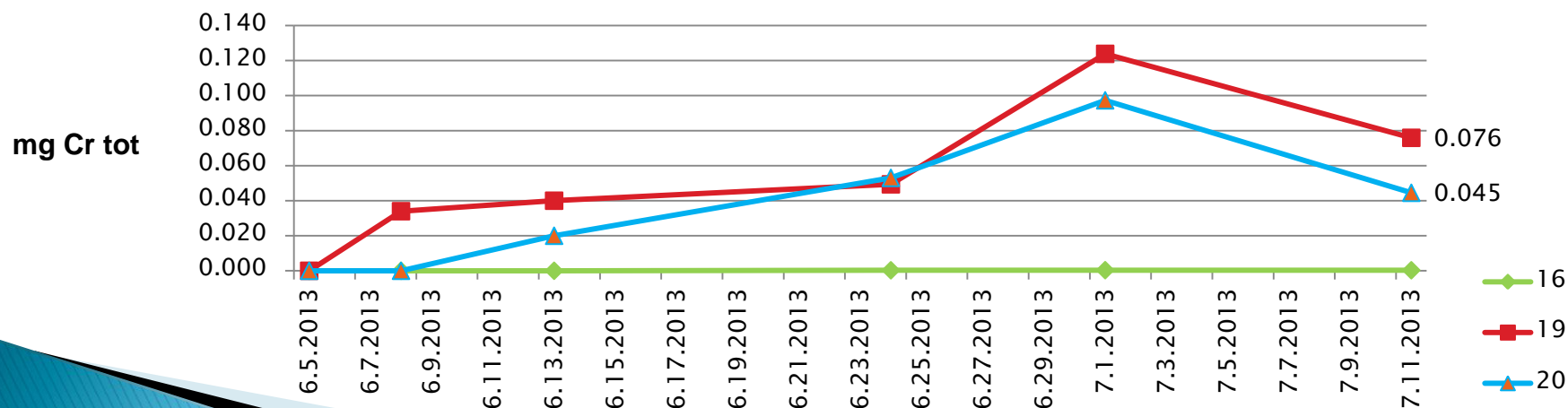


# First results (II)

## Cr (VI) leaching from soil with Cr(III) salts added

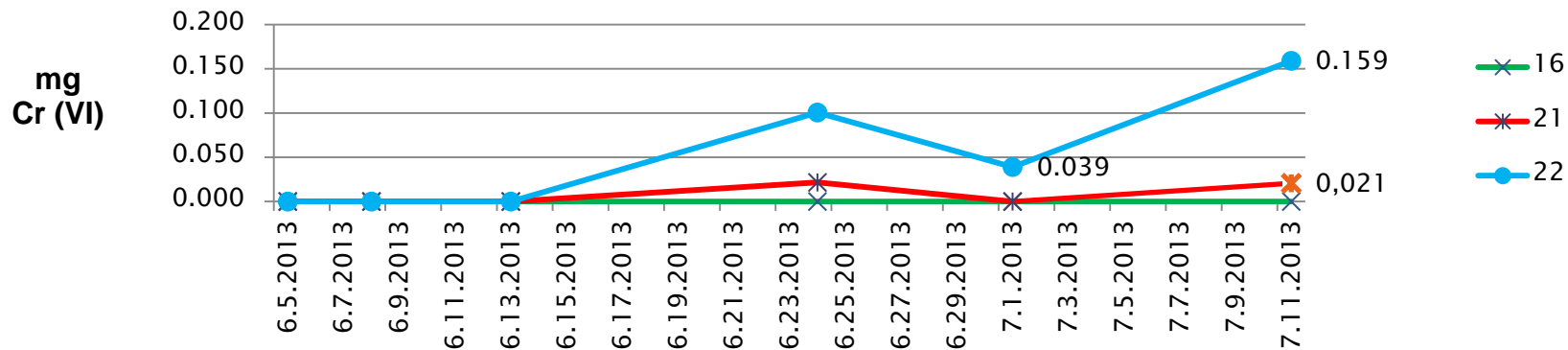


## Cr (tot) leaching on soil with Cr(III) salts added

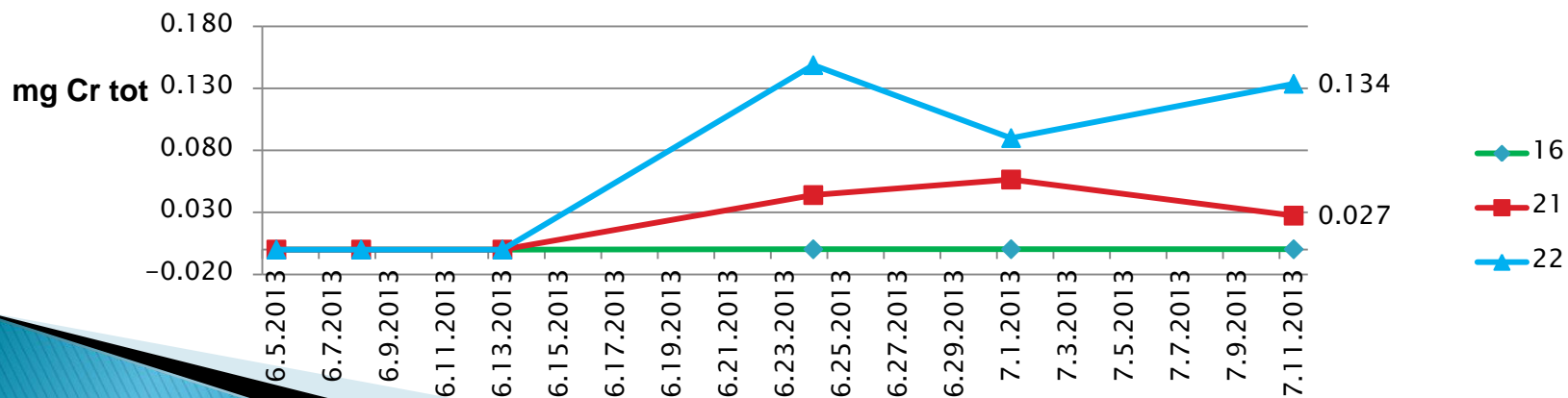


# First results (III)

## Cr (VI) leaching from soil with tannery compost added



## Cr (tot) leaching from soil with tannery compost added



# Conclusions

- ▶ In 2013 we just experimented materials and methods
- ▶ YEAR 2014
- ▶ We started with a new set of experiments
- ▶ Study of the behaviour of Chromium in soils
  - added as pure salt
  - when coming from industrial sludges used as fertilizers (compost coming from tanneries)
  - in different situations
    - more organic substrate
    - more bacteria activity

# New experimental plan



**Thesis 1 -  $\text{Cr}(\text{NO}_3)_3$  added  
1600 mg/Kg of Cr(III)**

**Thesis 2 - Tannery sludge added  
1600 mg/Kg of Cr(III)**

**Thesis 3 -  $\text{K}_2\text{CrO}_4$  added  
150 mg/Kg of Cr(VI)**

**Thesis 4 -  $\text{K}_2\text{CrO}_4$  added  
150 mg/Kg of Cr(VI)  
+ HUMIC ACIDS**

**Thesis 5 -  $\text{K}_2\text{CrO}_4$  added  
150 mg/Kg of Cr(VI)  
+ GLUCOSE**

**Elutions**

**from 06/06/2013 to 11/07/2013  
Experiments in double**



# AGRI-KNOWS

Knowledge transfer in agriculture  
as an added value in protecting  
the environment

**Hvala za vašo pozornost!**  
**Grazie per l'attenzione!**

*Projekt je sofinanciran v okviru Programa čezmejnega sodelovanja Slovenija-Italija 2007-2013 iz sredstev Evropskega sklada za regionalni razvoj in nacionalnih sredstev*  
*Progetto finanziato nell'ambito del Programma per la Cooperazione Transfrontaliera Italia-Slovenia 2007-2013, dal Fondo europeo di sviluppo regionale e dai fondi nazionali.*



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