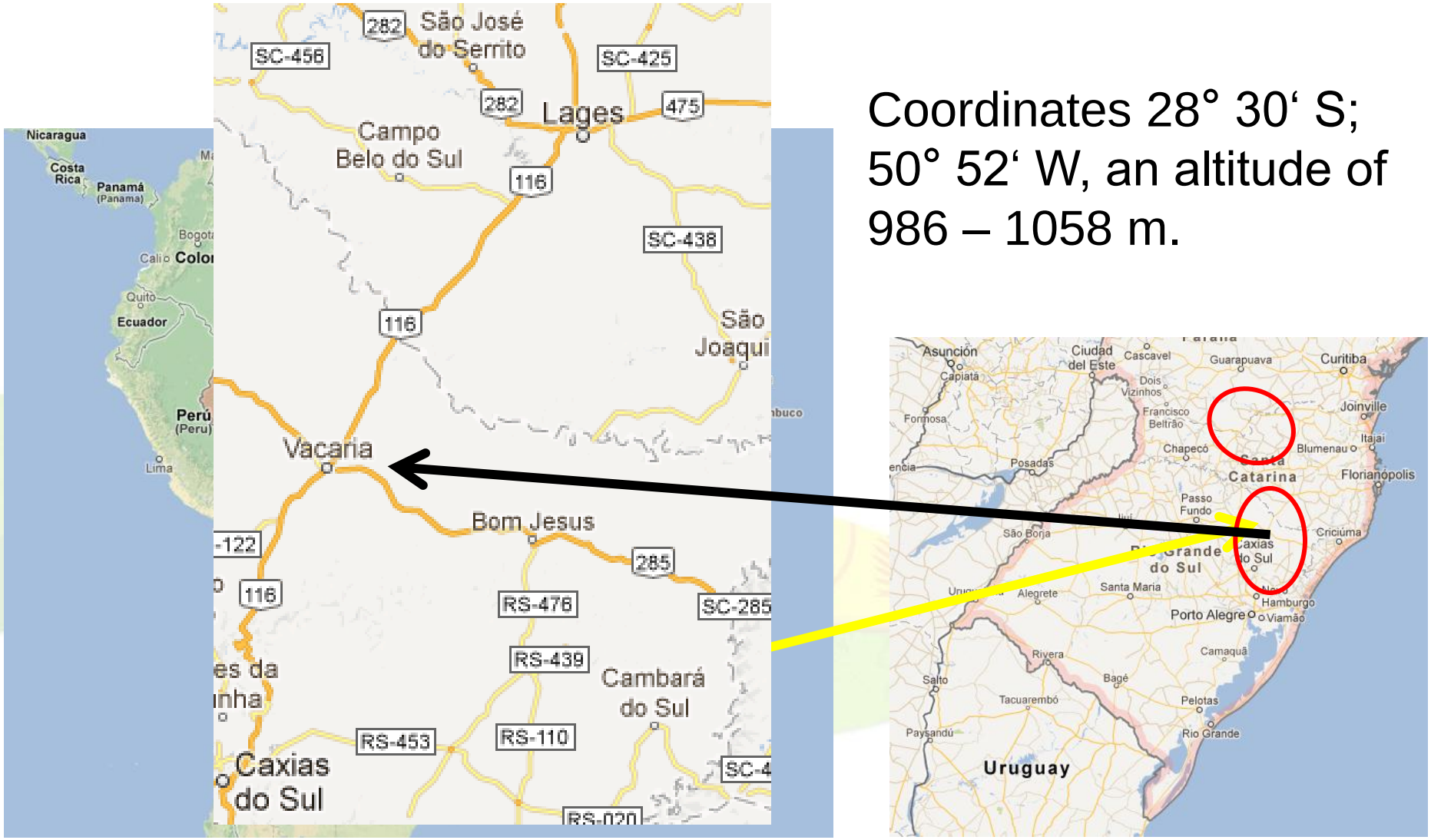
Ecotoxicological evaluation of different biobed substrates in Brazil: preliminary results

Luciano Gebler, Regis Sivori Silva dos Santos
Embrapa Temperate Fruit research Station

Taisa Dal Magro, Maria Margareth Zamboni Pinotti
Caxias do Sul University

Embrapa
Grape and Wine

Where are we?



Coordinates 28° 30‘ S; 50° 52‘ W, an altitude of 986 – 1058 m.

Temperate Fruit Research Station

Caxias do Sul University

Vacaria and region

Climate : humid and mild (1600 – 1800 mm of rain and 16 °C/60.8 Fahrenheit of average temperature of year)

Agriculture: Fruits (apple) and grains (corn, soybean and wheat)

40% area application of mechanization (80% production)

Apple = 100% mechanization

Biobed project I

Ecotoxicological evaluation use of bioreactors “Biobed model” for pre-disposal of wastewater of washing of machines and agricultural implements pads in temperate fruits

- Approved at november 2012
- Begin at april 2013
- Introducing chemical analisys (Chemical Department of Santa Maria University)
- End at november 2014.

Biobed project II

- Ecotoxicological evaluation of different bioreactors substrates for final disposal of waste pesticide from point sources.

  - Begun at december 2011;
  - 6 months results from 18 months total project;
  - Microorganisms
  - Worms
  - Susceptible plants
  - No chemichal analisys

Biobed project II

Methodology

- 3 substrates
  - **SPT** - Soil 20% + Peat 20% + Straw 60%
  - **S** - Orchard soil 100% (10 cm depth maximum)
  - **SS** - Orchard soil 50% + Branches chopped (6 months compost) 50%
- 2 pesticides (**I**nsecticide chlorpyriphos, **H**erbicide gluphosinate) and **M**ixture of both
- 3 depth (0-50 cm **U**p; 50-100 cm **A**verage, 100-150 cm **B**ottom) + 1 depth (0-50 cm)
- Reactors blocked in time (tzero end of september, every 2 months until t6 - 12 months), outdoors.
- Statistics (fatorial analisys, tukey 5%);

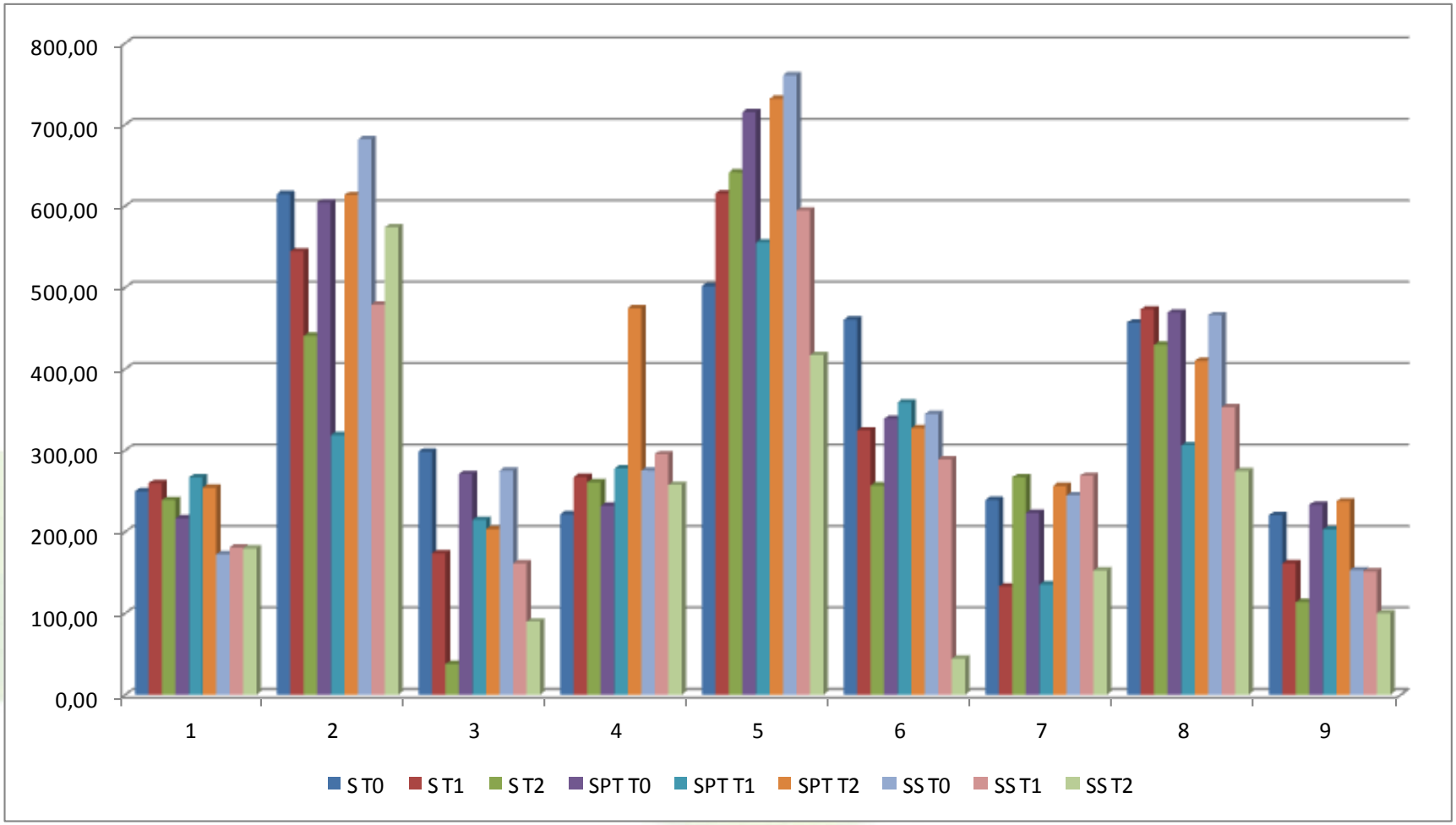

CONTEÚDO: 5 litros

Results

Microorganisms 6 moths (Microbial activity response by fluorescein acetate)

- Response to factors substrate and depth, but not to pesticide;
- Better substrate (in order of response) = **SPT** > **S** > **SS**
- Depth **B** response better than **U** and **A** (no difference between **U** and **A)**
- **H**erbicide presentes microbial response better than **I**nsecticide or **M**ixture.
- Reactor with 50 cm only was lost by excessive rain. Total depth recommended will be 1,5 m at least with bottom sealed.

Microorganism activity response (mg fluorescein acetate)

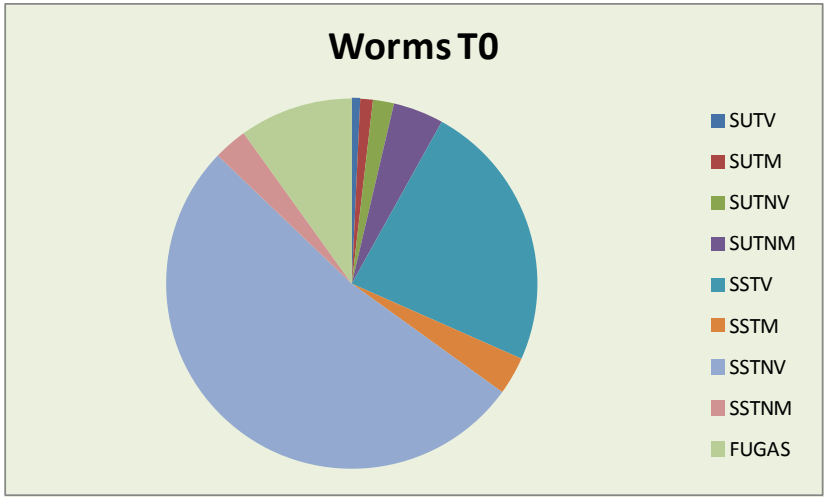


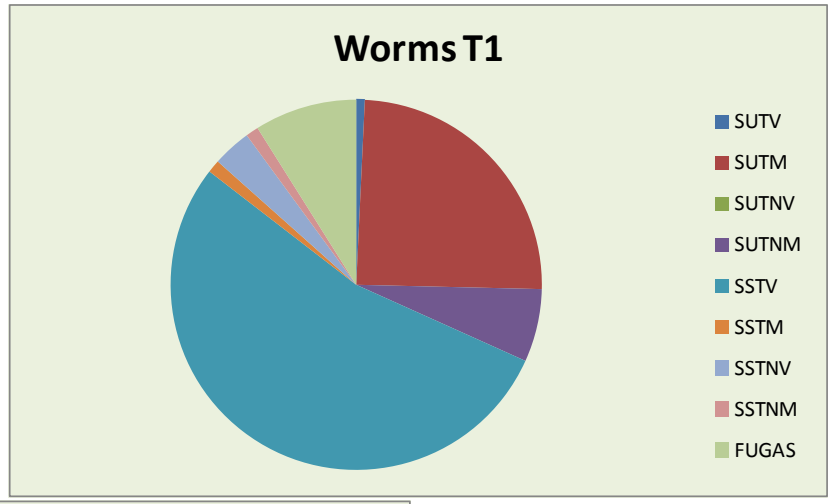
1, 4,& 7 = contamination with chlorpyrifos, 2, 5 & 8= contamination with glufosinate, 3, 6 & 9= mixture of pesticides; S= Soil, SPT=Swedish substrate, SS=50% soil+50% branches of fruit trees shredded and composted; T0=2 days after pesticide application, T1=3 months after T0; T2= 6 months after T0.

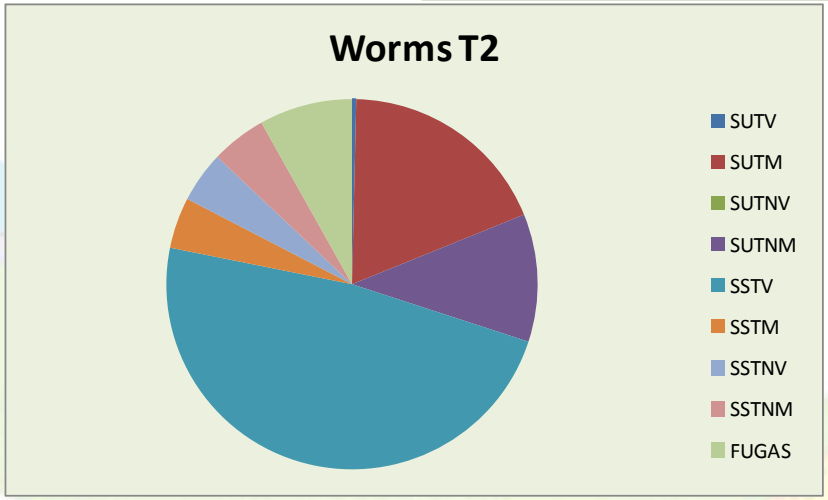
Results

Worms and susceptible plants

- Expected response in T0, but singular behavior at T1 and T2;
- Problems with SPT and SS (Escape).
- Wait more analisys
- Plants did not answer to experiment condition (dead at free soil)
- Changing susceptible specie (Lectuce to Cucumber)







SUTV - Surface, soil treated, alive; SUTM - Surface, soil treated, dead; SUNTV - Surface, soil non treated, alive; SUNTM - Surface, soil non treated, dead; SSTV - Buried, soil treated, alive; SSTM - Buried, soil treated, dead; SSNTV - Buried, soil non treated, alive; SSNTM - Buried, soil non treated, dead; Fugas - Escape

Conclusions

- At south of Brazil Biobeds demands more depth due the quantity and intensity of the rain (1,5 meters with bottom sealed);
- SPT has better response to microorganisms, but problems with macroorganisms
- SS didn´t work until now.
- Need to have chemical analisys.

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Thank you!

Luciano Gebler
luciano.gebler@embrapa.br

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