

# *Radopholus similis* water spreading in banana fields grown on halloysitic ultisols in Martinique

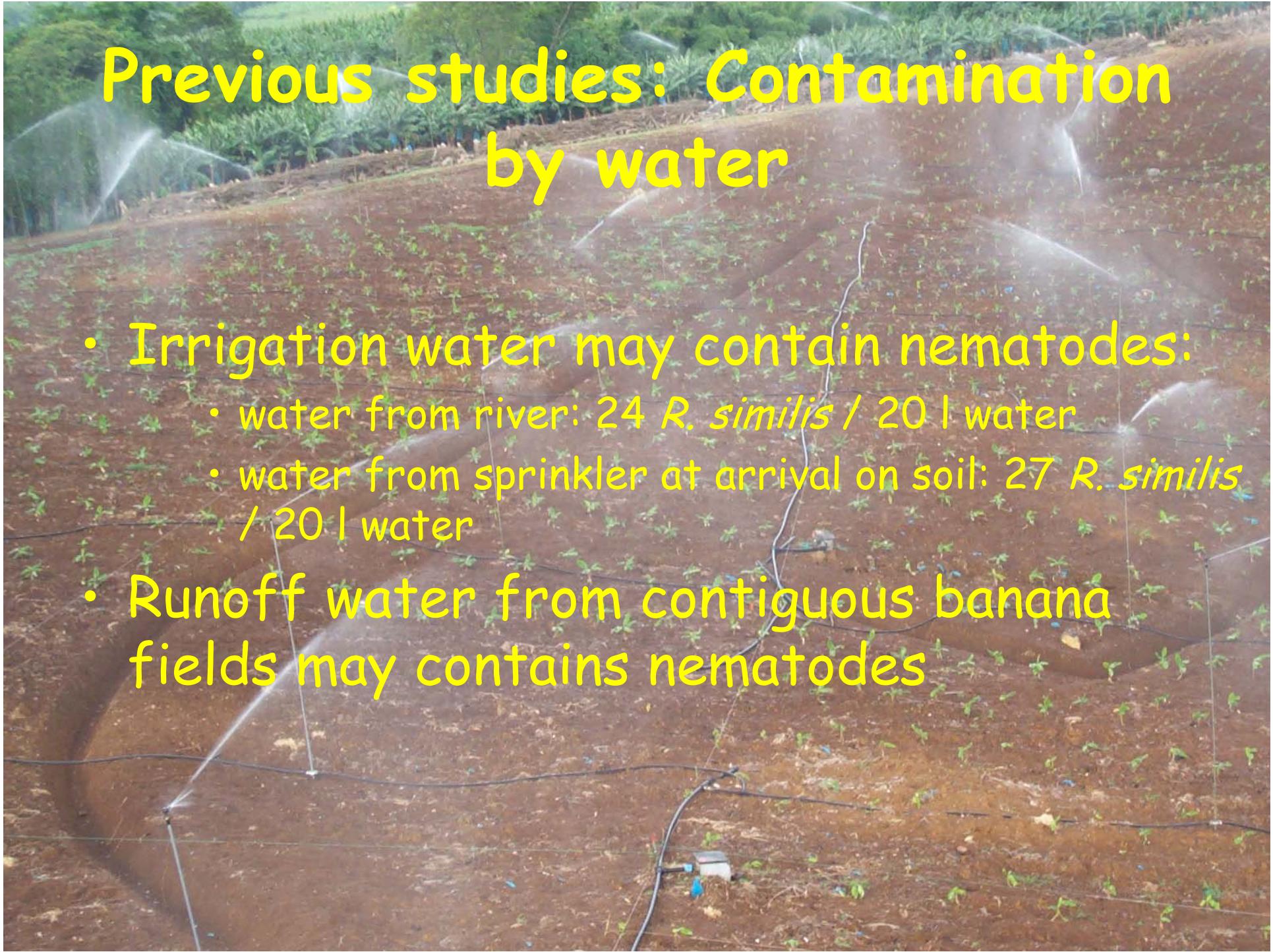
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# Context

- Development of new crop system
  - based on soil sanitation (fallow or rotation crop) + nematode free vitroplants
    - ↳ plantations free of *Radopholus similis* for 2 - 4 years (fallow)
    - ↳ reduction of nematicide uses of 63% without production losses
    - ↳ to reach 0 nematicide : research needed to understood the recontamination process



# Previous studies: Contamination by water

- Irrigation water may contain nematodes:
  - water from river: 24 *R. similis* / 20 l water
  - water from sprinkler at arrival on soil: 27 *R. similis* / 20 l water
- Runoff water from contiguous banana fields may contains nematodes

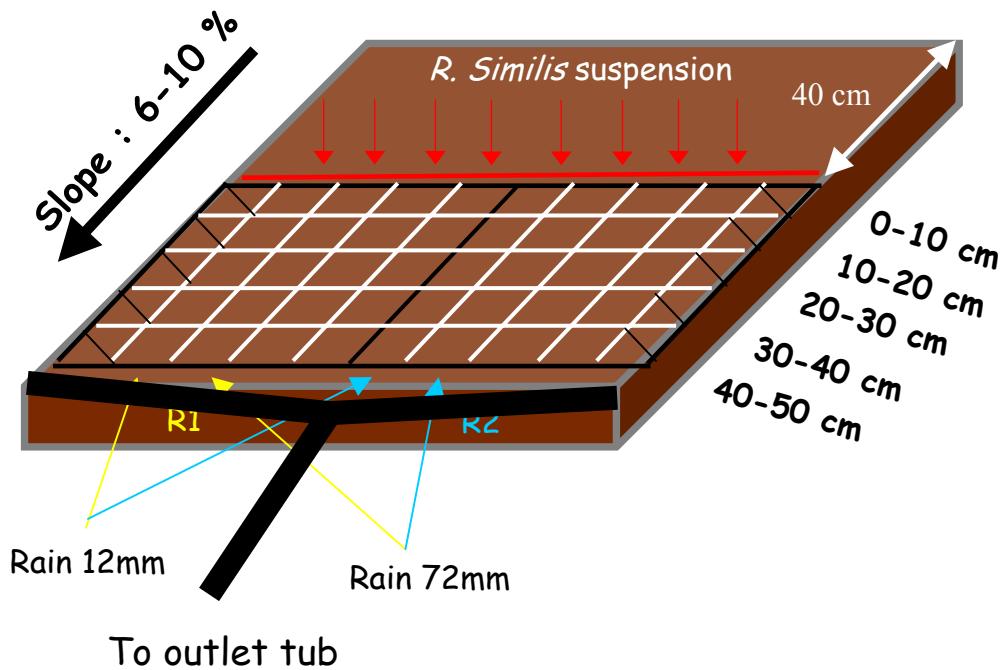
# Objective

- Hypothesis: passive dissemination of *Radopholus similis* by water flow
- At the metric scale:
  - runoff spreading: rain simulator
  - infiltration spreading: soil cylinders
- At the field scale: field trial

# Runoff spreading

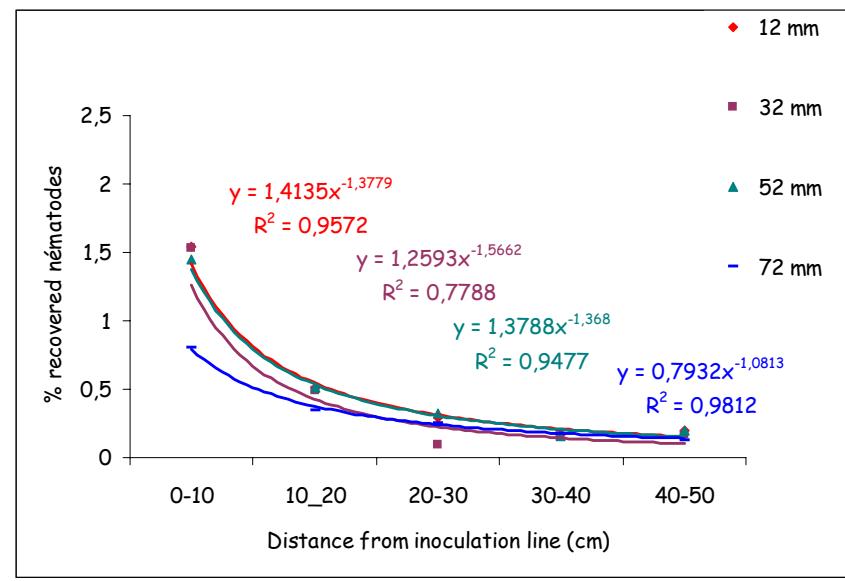
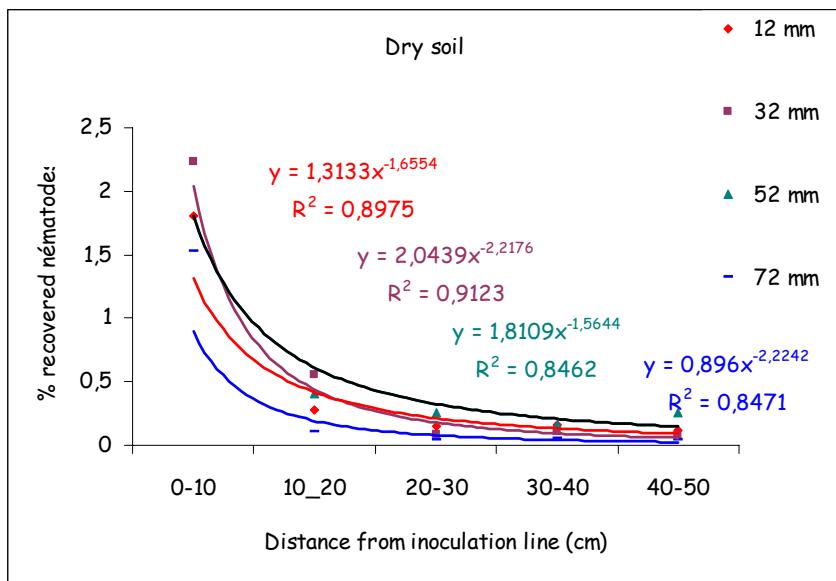


# Runoff spreading



- / Micro plot ( $1m^2$ )
- 60 mm /h
- 4 ≠ rains duration (12 to 72 mn)
- 2 ≠ soil initial humectation  
Wet (50g water/100g dry soil)  
and humid (61g/100g)
- X 3 microplots  
( $\hookrightarrow$ 6 replicates)

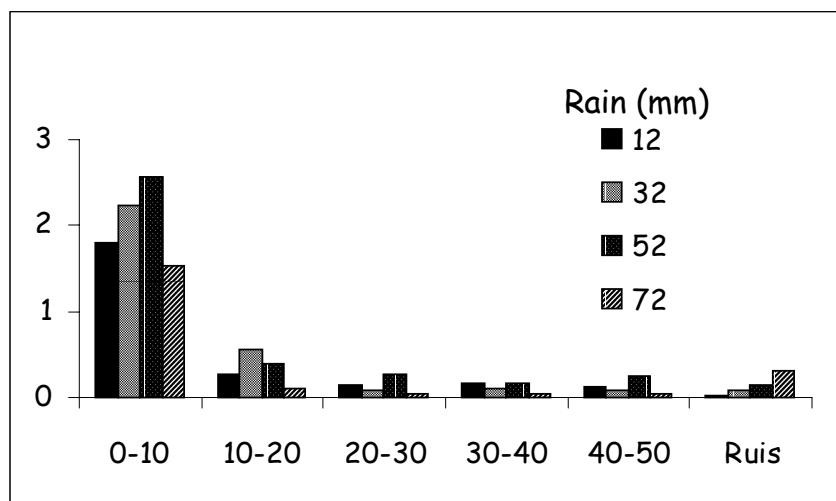
# Runoff spreading: results



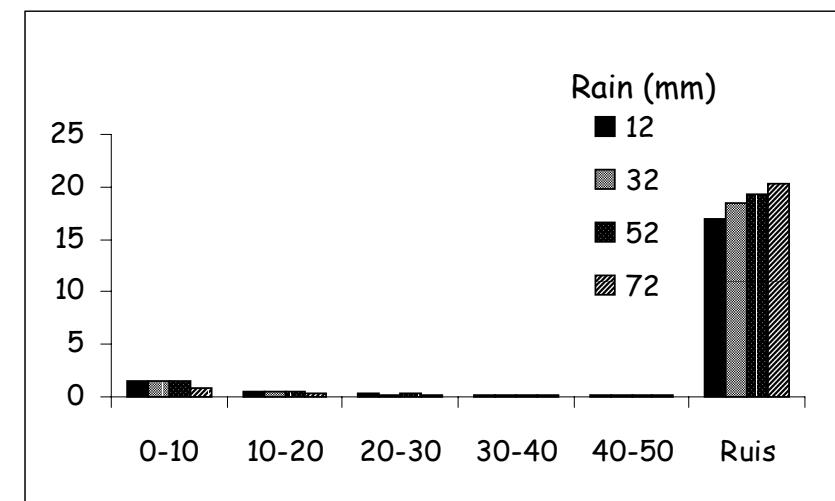
Dry soil

Wet soil

# Runoff spreading: results



Dry soil



Wet soil

# Infiltration spreading



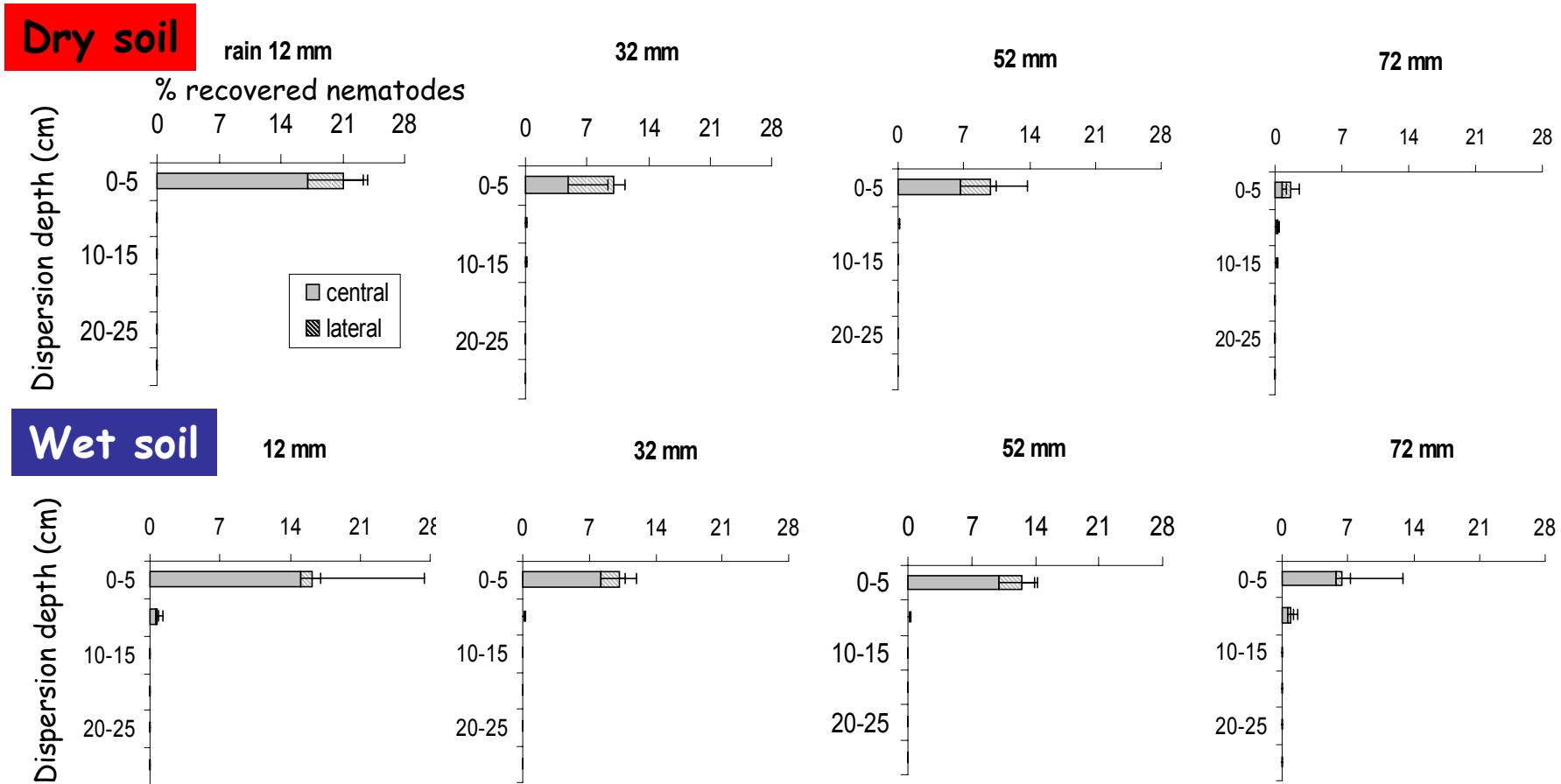
# Infiltration spreading



# Infiltration spreading

- 2 ≠ soil initial humectation  
Wet (35 g water/100g dry soil)  
and humid (59 g/100g)
- 4 ≠ rains (from 12 to 72 mm)
- 4 repetitions

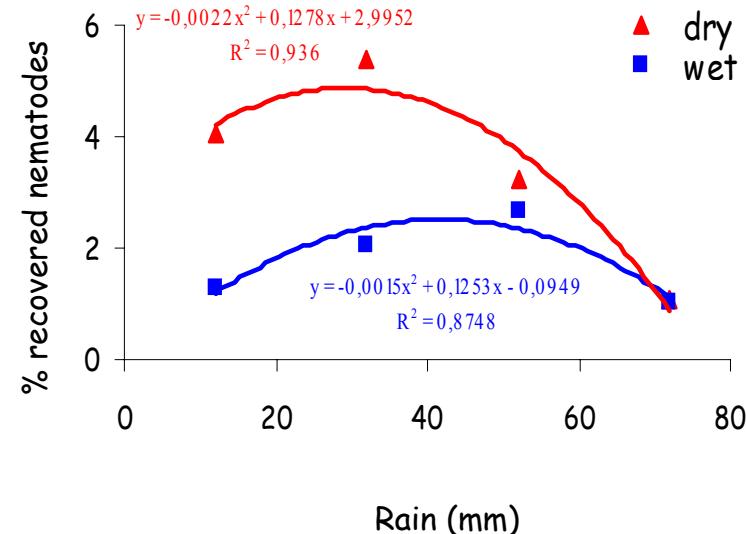
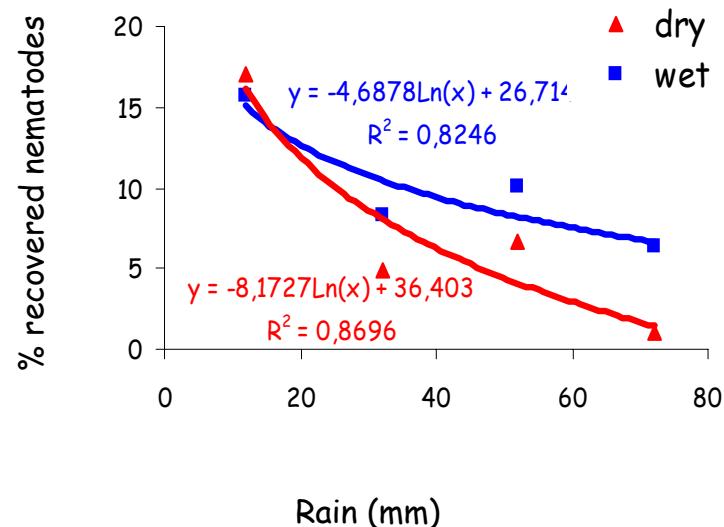
# Infiltration spreading



extraction by elutriation

# Infiltration spreading: results

- Very low population under 10 cm depth  
(by elutriation 88% of negative samples under 15 cm depth)
- The heavier the Rain, the poorer the recovery



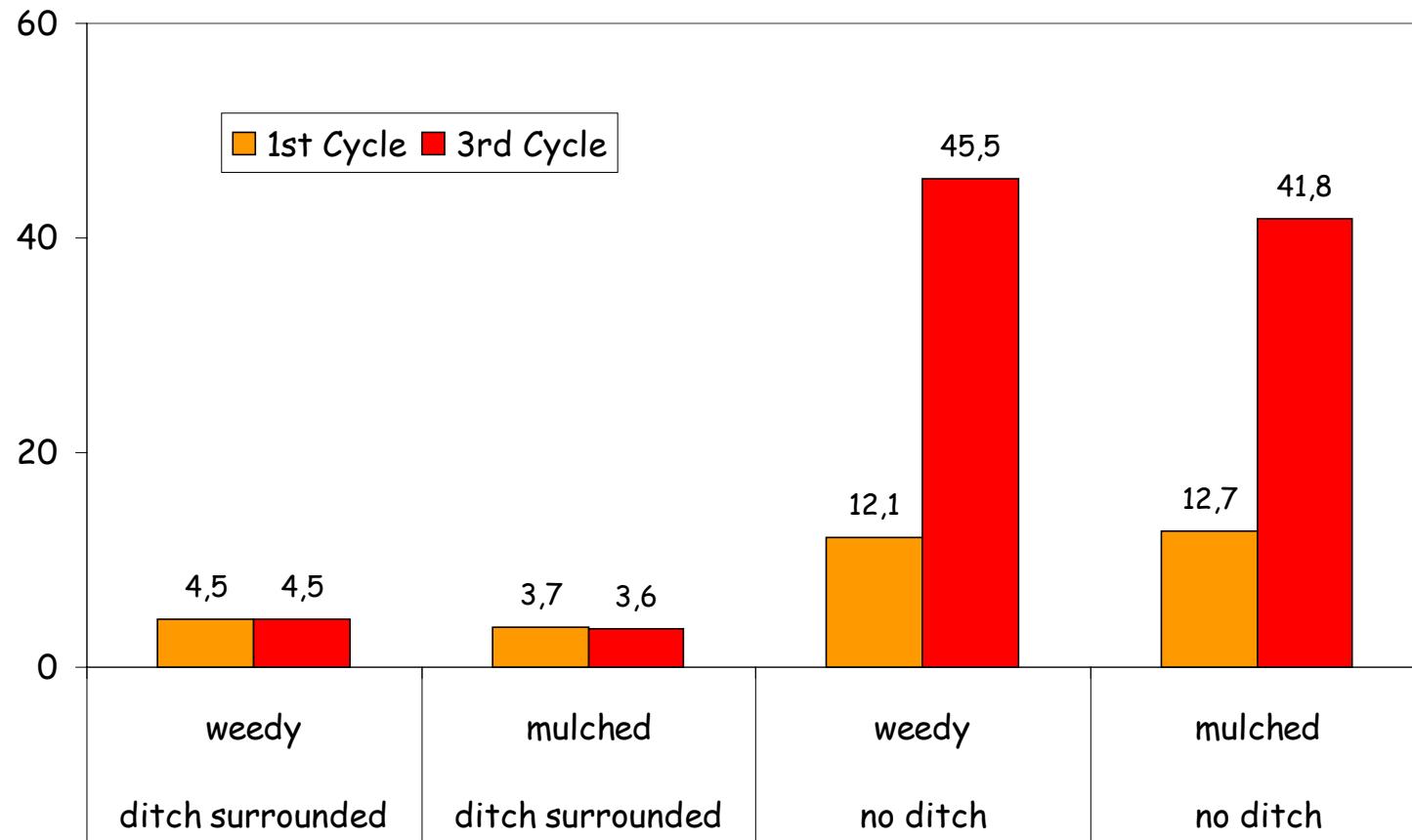
# Infiltration spreading: results

- Very low population under 10 cm depth  
(by elutriation 88% of negative samples under 15 cm depth)
- The heavier the Rain, the poorer the recovery
- Evidence of oblique soil dispersion

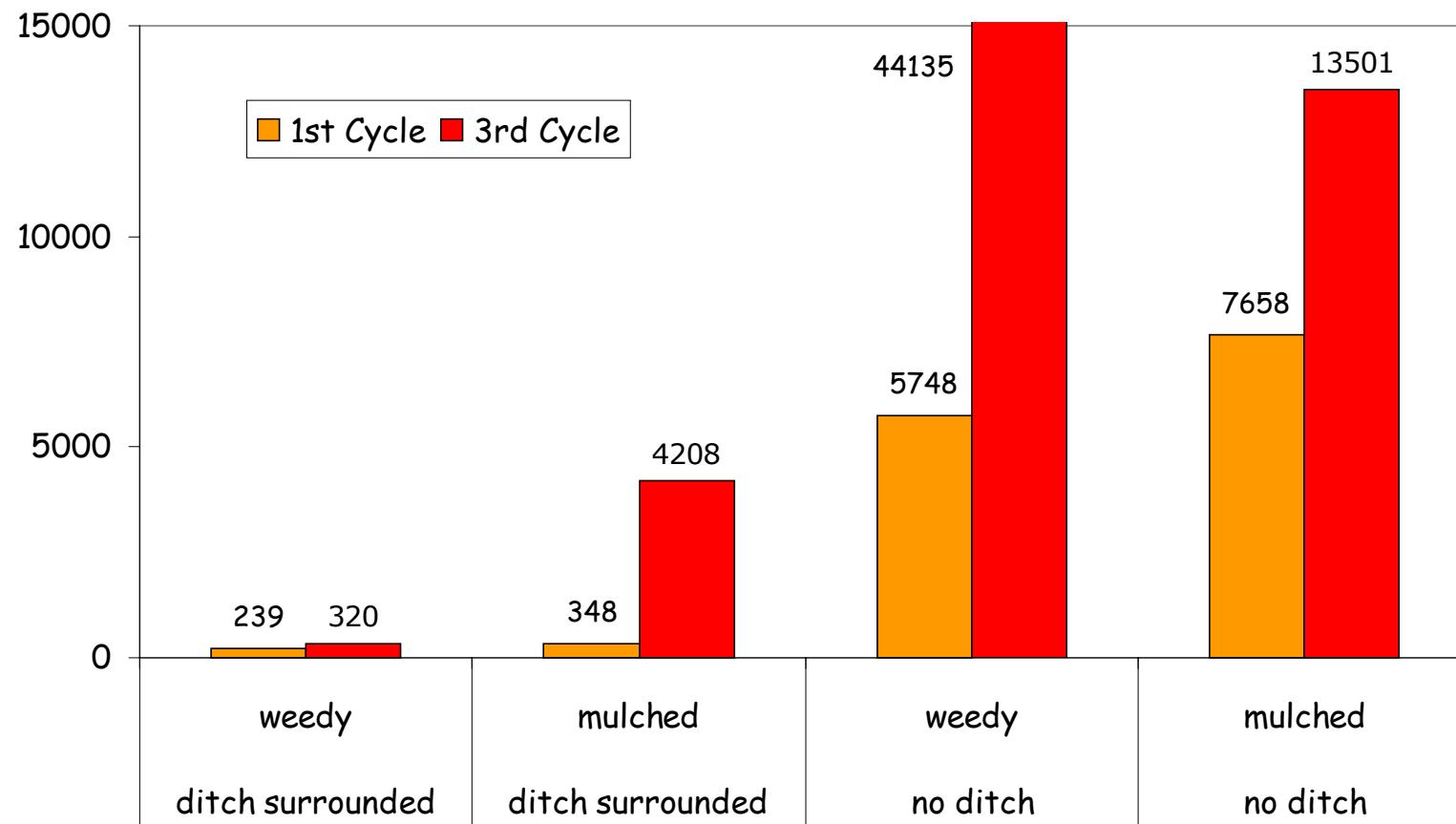
# Field trial

- 4 plots downstream to an highly contaminated banana field
- 4 treatments: fallow management (mulched / no weed management) combined with protection against water stream (ditch / no ditch)
- Nematodes numeration plant by plant at flowering during 2 years (3 cycles)

# Field trial: proportion of infested plants



# Field trial: nematode Prominence Value index

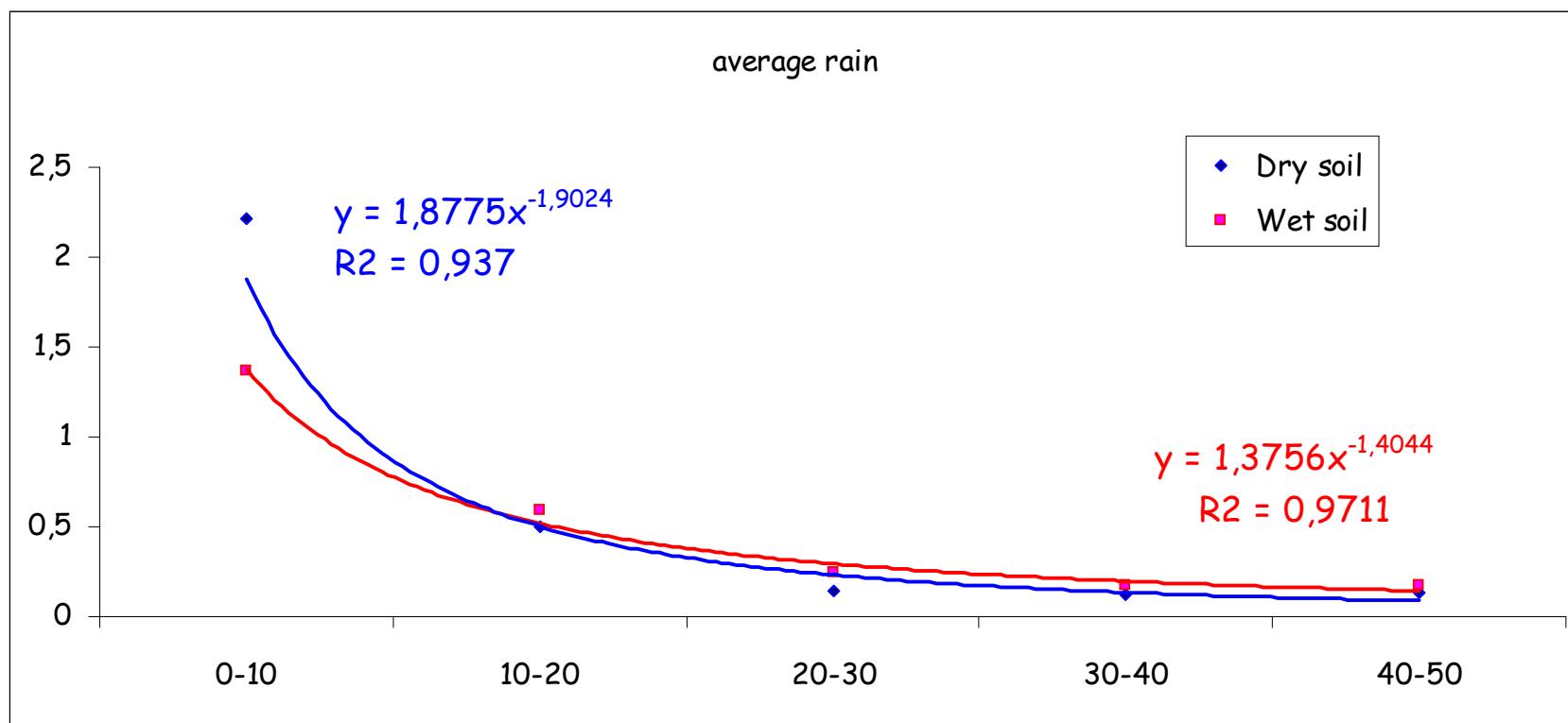


# Conclusion

- Dispersion of *R. similis* by run off
  - When soil surface close to water saturation
  - When run-off begins
- Percolation: mainly less than 10 cm deep
- Importance of oblique dispersion to be investigated
- Large scale: dispersion is prevented by drainage ditches

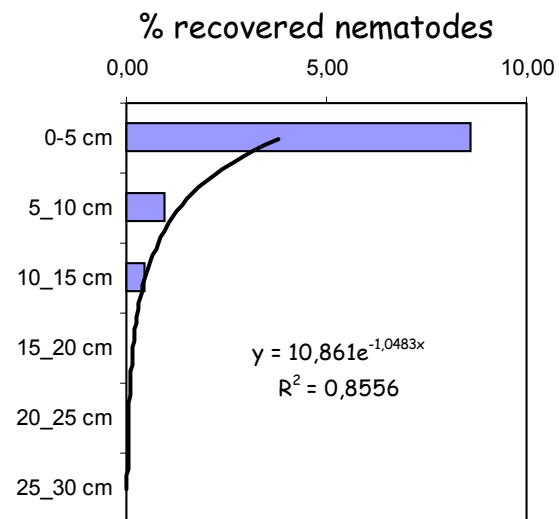


# Runoff spreading : results

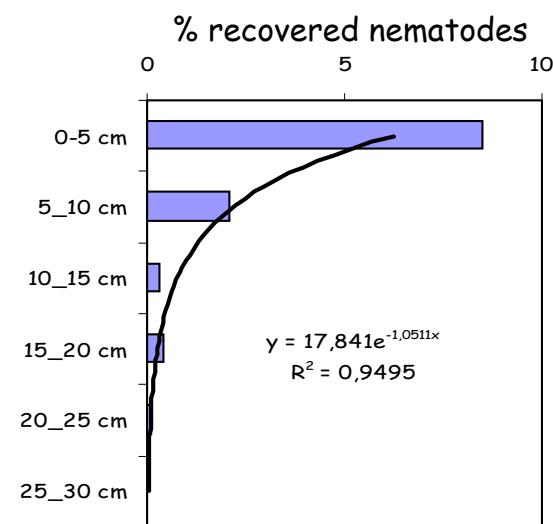


# Infiltration spreading : results

Wet soil - rain 32 mm



Wet soil - rain 72 mm



extraction by centrifugation/flotation