



WATER PHYTOSANITARY RISK MANAGEMENT IN SOILLESS CROPS



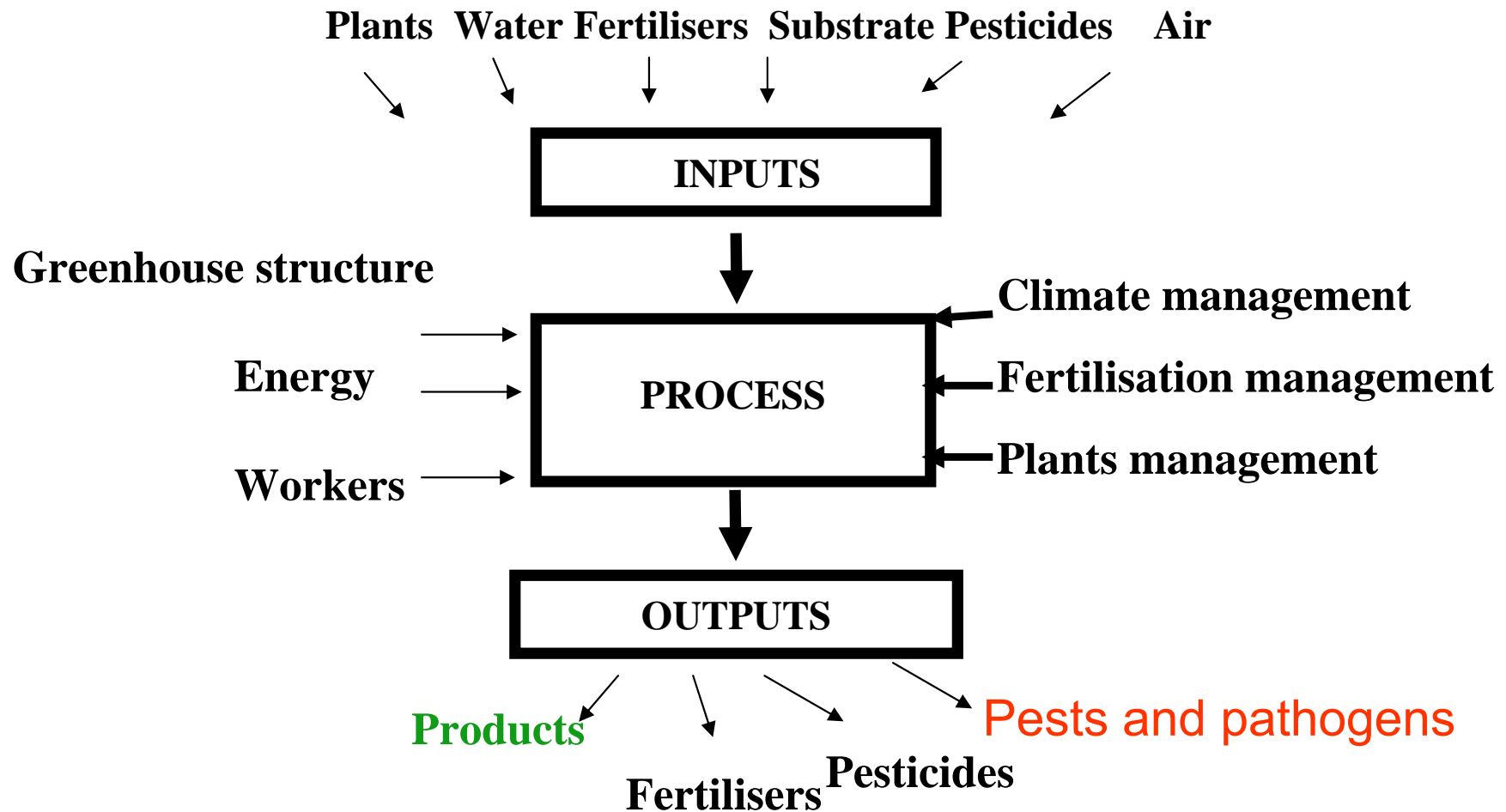
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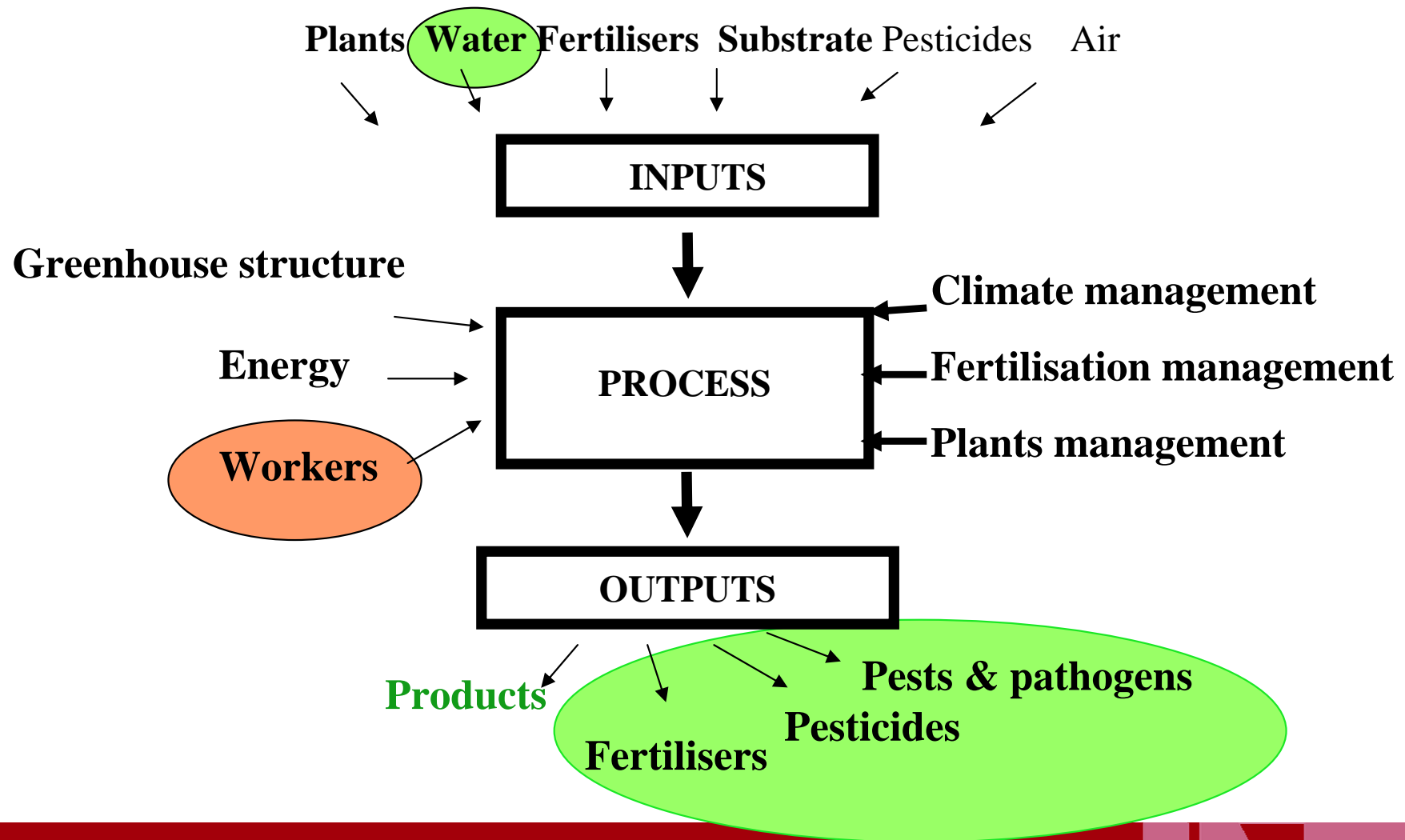
² INRA- URIH, 400 route des Chappes, BP 167, 06903 Sophia Antipolis Cedex (**France**)

Optimisation of nutritional and environmental conditions for plant growth

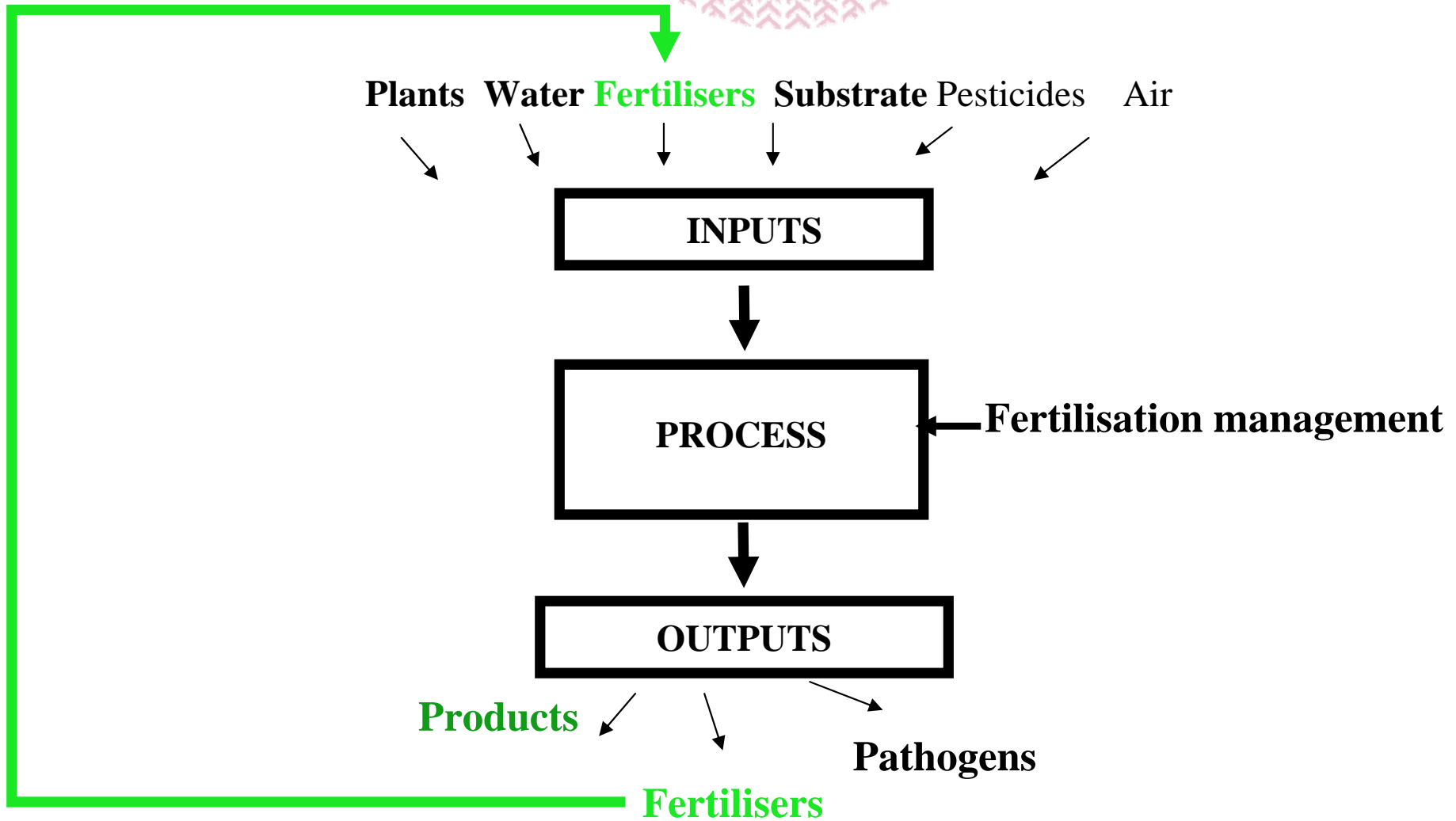
Pests and pathogens



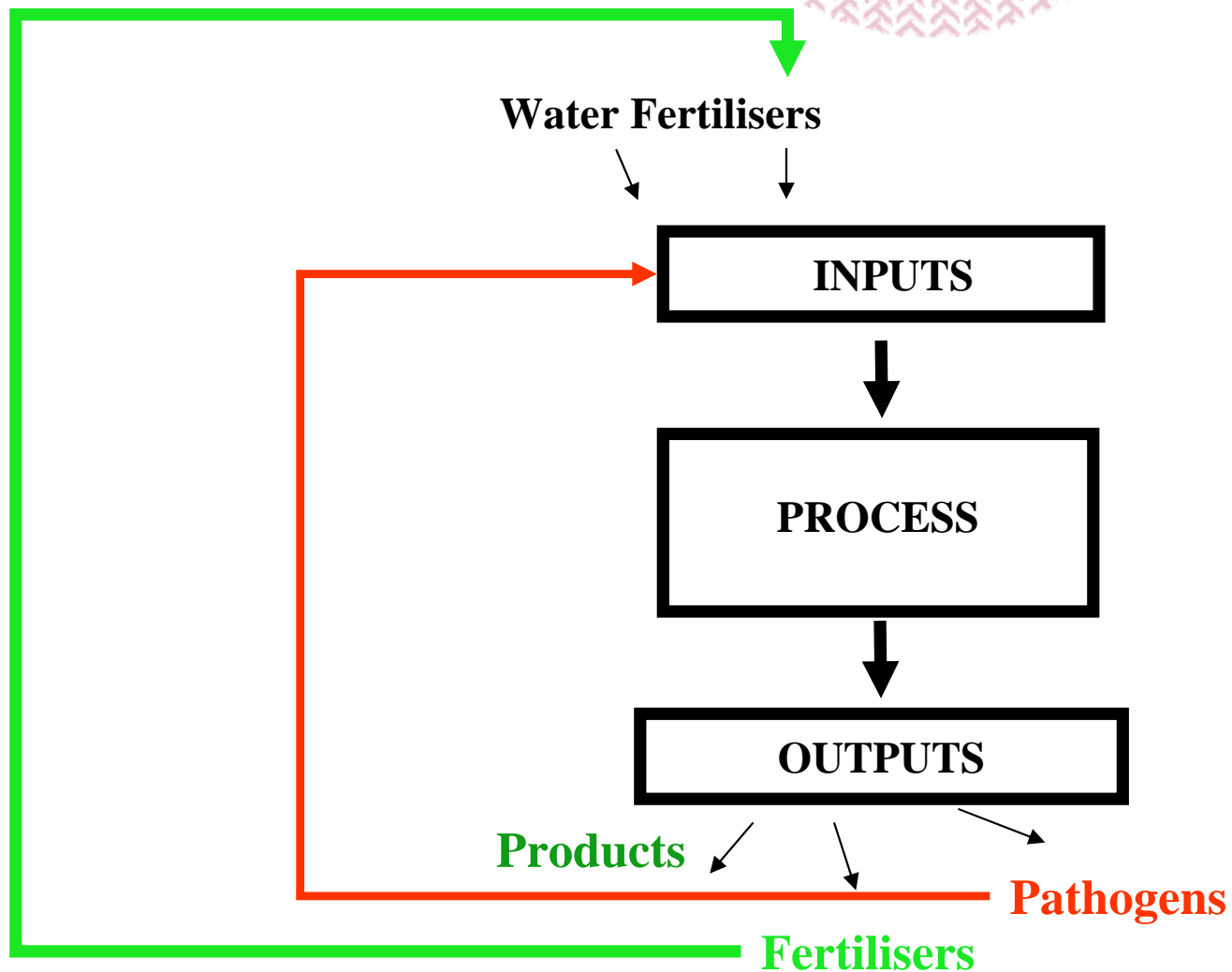
HIGH COST: economical but also social and environmental



Recycling drainage water



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Pathogens well adapted to dissemination via water such as fungi, bacteria...



Phytophthora sp.

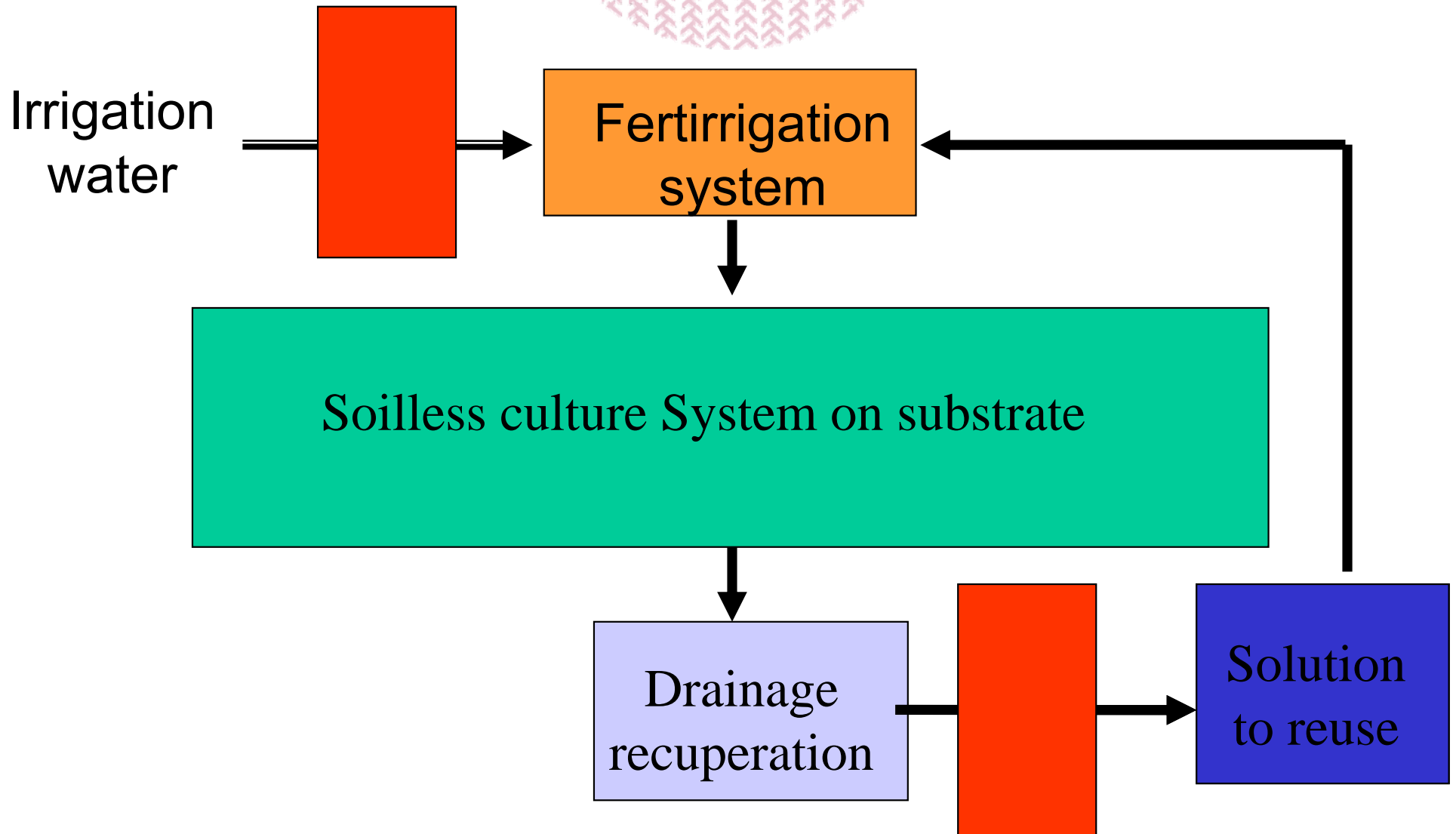
Fusarium sp.

Agrobacterium tumefaciens



Determining pathogens density to assess phytosanitary risk for cultures is:


- too expensive
- not reliable for routine diagnostic
- ▶ Prophylactic methods for:
 - Workers, plants, structure, substrate...
 - water disinfection





Choice of a disinfection method

- Depends on:
 - irrigation water sanitary quality,
 - volume to be treated,
 - physico-chemical properties of the solution,
 - cost of investment and functioning
 - ...

- 
- **Biological: partial disinfection:**
ex: slow sand filtration
 - **Chemical : action on nutrients**
ex: ozone, gaseous chlorine treatments
 - **Physical : efficiency depends on water quality**
ex: thermodisinfection, UV treatment



- ▶ **All these methods acts on water**
- ▶ **What about roots where pathogens interact with plants?**

Objective

- What is the influence of nutrient solution physico-chemical management on bacterial communities dynamics?

- INRA- URIH (Research Unit on Integrated Horticulture)



M & M

➤ in a highly manageable hydroponic system:
Nutrient Film Technique

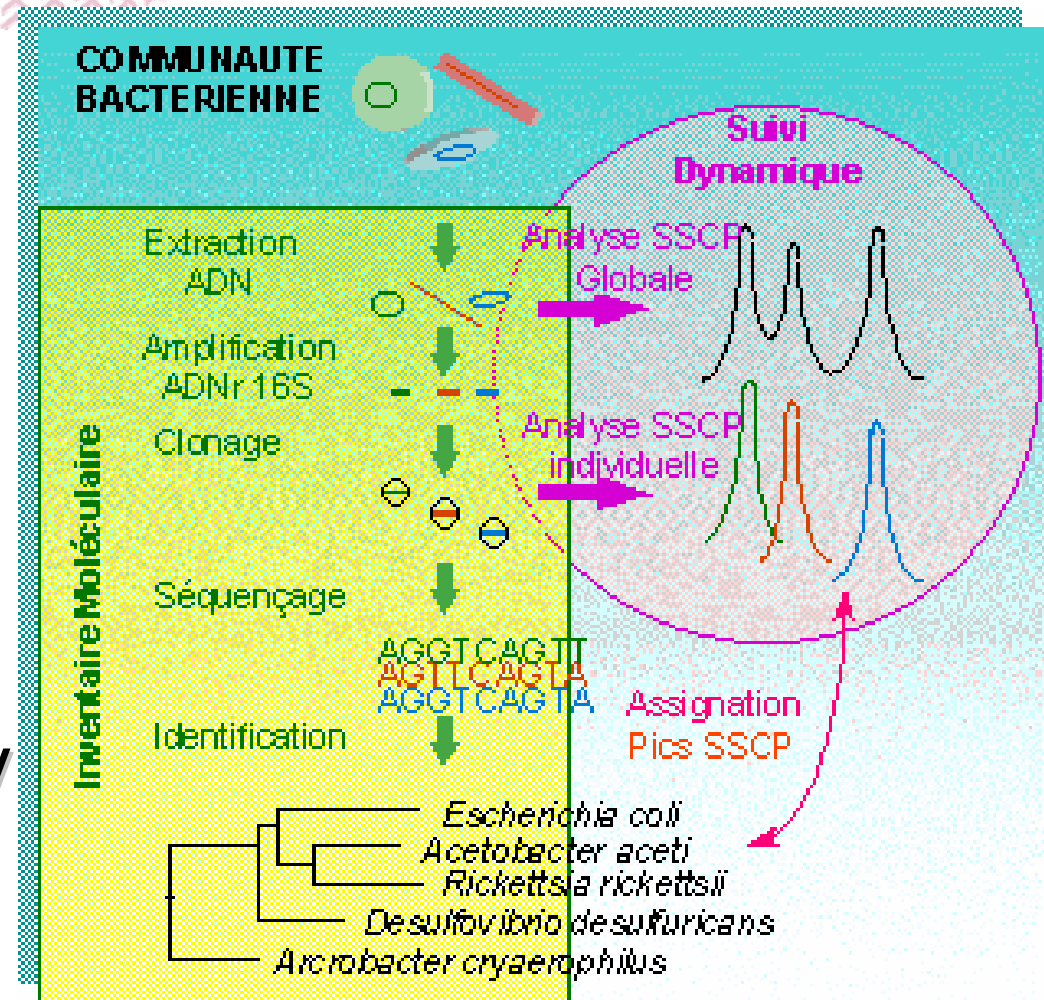


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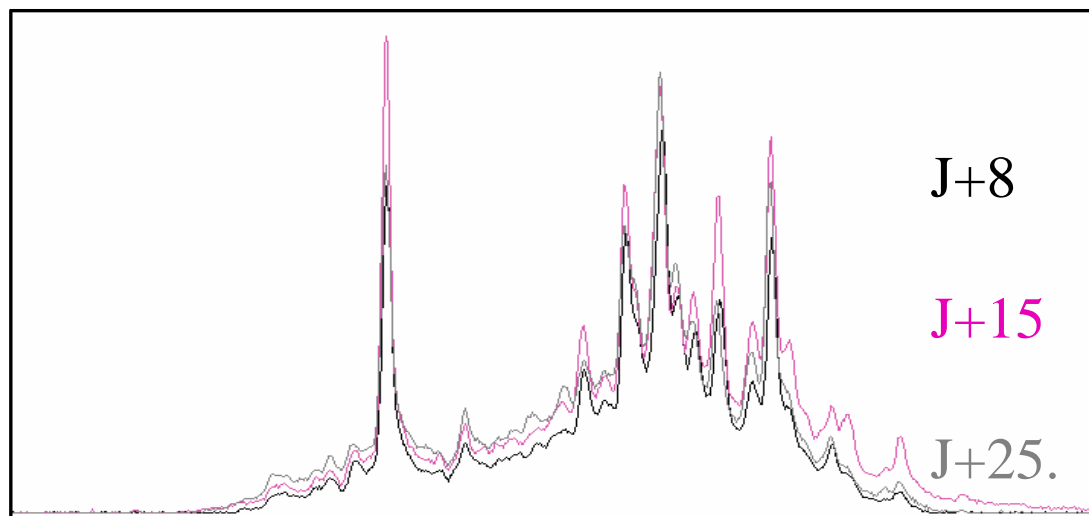
» Bacterial communities adhering to roots were subjected to physico-chemical regulations

➤ Assessment of rhizoplane microbial communities' dynamics by molecular method: PCR-SSCP fingerprinting



PARTIAL RESULTS

- Although EC and temperature variations, pH represent a strong stabilisation factor for roots' microbial communities



Chave & al, 2008, *Crop protection*

DISCUSSION

- ▶ Regulation of the **physicochemical environment of roots contribute to** manage rhizosphere communities
- ▶ enhancement of rhizosphere communities robustness could be a way to exclude soilborne pathogens



Conclusions- Perspectives

- **Protected agriculture process (climate, fertirrigation management, ...) increase productivity and can also be tools to manage pests and pathogens.**
- **Protected agriculture can be developed in a sustainable way integrating: economic but also social and environmental issues**



Thank you for your attention!

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